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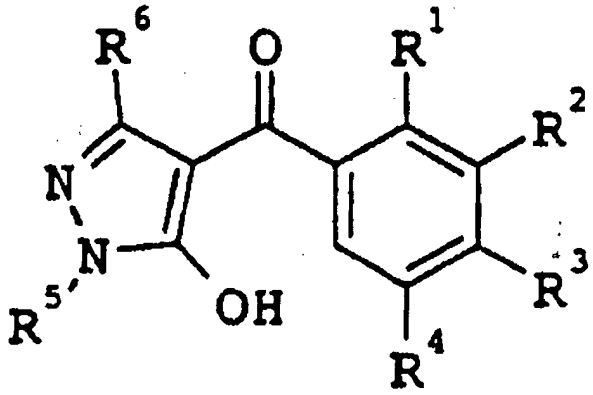
(54) MELANGES HERBICIDES A EFFET SYNERGIQUE
(54) HERBICIDAL MIXTURES HAVING A SYNERGISTIC EFFECT



I

(57) L'invention concerne un mélange herbicide à effet synergique contenant A) au moins un dérivé benzoyle à substitution 3-hétérocyclyle de la formule (I), dans laquelle les variables ont la signification suivante: R^1, R^3 sont hydrogène, halogène, alkyle, halogénure d'alkyle, alcoxy, halogénure d'alcoxy, alkylthio, alkylsulfinyle ou alkylsulfonyle; R^2 est un radical hétérocyclique choisi dans le groupe: thiazol-2-yl, thiazol-4-yl, thiazol-5-yl, isoxazol-3-yl, isoxazol-4-yl, isoxazol-5-yl, 4,5-dihydroisoxazol-3-yl, 4,5-dihydroisoxazol-4-yl et 4,5-dihydroisoxazol-5-yl, ceux-ci pouvant être substitués éventuellement une fois ou plusieurs fois par halogène, alkyle, alcoxy, halogénure d'alkyle, halogénure d'alcoxy ou alkylthio; R^4 est hydrogène, halogène ou alkyle; R^5 est alkyle; R^6 est hydrogène ou alkyle; ou bien un de ses

(57) The invention relates to synergistic herbicidal mixtures containing A) at least one 3-heterocyclyl-substituted benzoyl derivative of formula (I) in which the variables have the following meaning: R^1, R^3 represent hydrogen, halogen, alkyl, alkyl halide, alkoxy, alkoxy halide, alkylthio, alkyl sulfinyl, or alkyl sulfonyl; R^2 represents a heterocyclic radical selected from the group: thiazole-2-yl, thiazole-4-yl, thiazole-5-yl, isoxazol-3-yl, isoxazol-4-yl, isoxazol-5-yl, 4,5-dihydroisoxazol-3-yl, 4,5-dihydroisoxazol-4-yl and 4,5-dihydroisoxazol-5-yl, whereby these can be optionally substituted one time or a multiple number of times by halogen, alkyl, alkoxy, alkyl halide, alkoxy halide, alkylthio; R^4 represents hydrogen, halogen or alkyl; R^5 represents alkyl; R^6 represents hydrogen or alkyl; or one of the

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sels écophiles, et B) une quantité produisant un effet synergique d'au moins un composé herbicide du groupe des inhibiteurs de l'acétyl CoA carboxylase (ACC), des inhibiteurs de l'acétolactate synthase (ALS), des amides, des herbicides de l'auxine, des inhibiteurs de transport de l'auxine, des inhibiteurs de biosynthèse de la carotinoïde, des inhibiteurs d'énolpyruvyl-shikimat-3-phosphate-synthase (ESPS), des inhibiteurs de la glutamine-synthétase, des inhibiteurs de la biosynthèse lipidique, des inhibiteurs de la mitose, des inhibiteurs de la protophorphyrinogèn-IX-oxydase, des inhibiteurs de la photosynthèse, des agents synergiques, des substances de croissance, des inhibiteurs de biosynthèse de paroi cellulaire, et de différents autres herbicides. L'invention concerne des agents contenant ces mélanges, ainsi que leur procédé de préparation et leur utilisation pour lutter contre des végétaux parasites.

environmentally compatible salts thereof; and B) a synergistically effective quantity of at least one herbicidal compound from the group of acetyl CoA carboxylase inhibitors (ACC), acetolactate synthase inhibitors (ALS), amides, auxin herbicides, auxin transport inhibitors, carotinoid biosynthesis inhibitors, enolpyruvyl-shikimat-3-phosphate synthase inhibitors (ESPS), glutamine synthetase inhibitors, lipid biosynthesis inhibitors, mitosis inhibitors, protophorphyrinogen-IX-oxidase inhibitors, photosynthesis inhibitors, synergistic agents, growth substances, cell wall biosynthesis inhibitors and various other herbicides. The invention also relates to agents which contain these mixtures, to methods for producing these agents, and to the use thereof for controlling unwanted plants.

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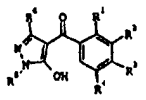
(54) Title: HERBICIDAL MIXTURES HAVING A SYNERGISTIC EFFECT

(54) Bezeichnung: HERBIZIDE MISCHUNGEN MIT SYNERGISTISCHER WIRKUNG



(I)

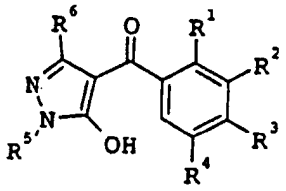
(57) Abstract

The invention relates to synergistic herbicidal mixtures containing A) at least one 3–heterocyclyl–substituted benzoyl derivative of formula (I) in which the variables have the following meaning: R^1, R^3 represent hydrogen, halogen, alkyl, alkyl halide, alkoxy, alkoxy halide, alkylthio, alkyl sulfinyl, or alkyl sulfonyl; R^2 represents a heterocyclic radical selected from the group: thiazole–2–yl, thiazole–4–yl, thiazole–5–yl, isoxazol–3–yl, isoxazol–4–yl, isoxazol–5–yl, 4,5–dihydroisoxazol–3–yl, 4,5–dihydroisoxazol–4–yl and 4,5–dihydroisoxazol–5–yl, whereby these can be optionally substituted one time or a multiple number of times by halogen, alkyl, alkoxy, alkyl halide, alkoxy halide, alkylthio; R^4 represents hydrogen, halogen or alkyl; R^5 represents alkyl; R^6 represents hydrogen or alkyl; or one of the environmentally compatible salts thereof; and B) a synergistically effective quantity of at least one herbicidal compound from the group of acetyl CoA carboxylase inhibitors (ACC), acetolactate synthase inhibitors (ALS), amides, auxin herbicides, auxin transport inhibitors, carotinoid biosynthesis inhibitors, enolpyruvyl–shikimat–3–phosphate synthase inhibitors (ESPS), glutamine synthetase inhibitors, lipid biosynthesis inhibitors, mitosis inhibitors, protophorphyrinogen–IX–oxidase inhibitors, photosynthesis inhibitors, synergistic agents, growth substances, cell wall biosynthesis inhibitors and various other herbicides. The invention also relates to agents which contain these mixtures, to methods for producing these agents, and to the use thereof for controlling unwanted plants.

HERBICIDAL MIXTURES HAVING A SYNERGISTIC EFFECT

The present invention relates to a synergistic herbicidal mixture comprising

A) at least one 3-heterocyclyl-substituted benzoyl derivative of the formula I



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in which the variables have the following meanings:

R^1, R^3 are hydrogen, halogen, C_1-C_6-alkyl, C_1-C_6-haloalkyl, C_1-C_6-alkoxy, C_1-C_6-haloalkoxy, C_1-C_6-alkylthio, C_1-C_6-alkylsulfinyl or C_1-C_6-alkylsulfonyl;

R^2 is a heterocyclic radical selected from the group: thiazol-2-yl, thiazol-4-yl, thiazol-5-yl, isoxazol-3-yl, isoxazol-4-yl, isoxazol-5-yl, 4,5-dihydroisoxazol-3-yl, 4,5-dihydroisoxazol-4-yl and 4,5-dihydroisoxazol-5-yl, it being possible for the nine radicals mentioned to be unsubstituted or mono- or polysubstituted by halogen, C_1-C_4-alkyl, C_1-C_4-alkoxy, C_1-C_4-haloalkyl, C_1-C_4-haloalkoxy or C_1-C_4-alkylthio;

R^4 is hydrogen, halogen or C_1-C_6-alkyl;

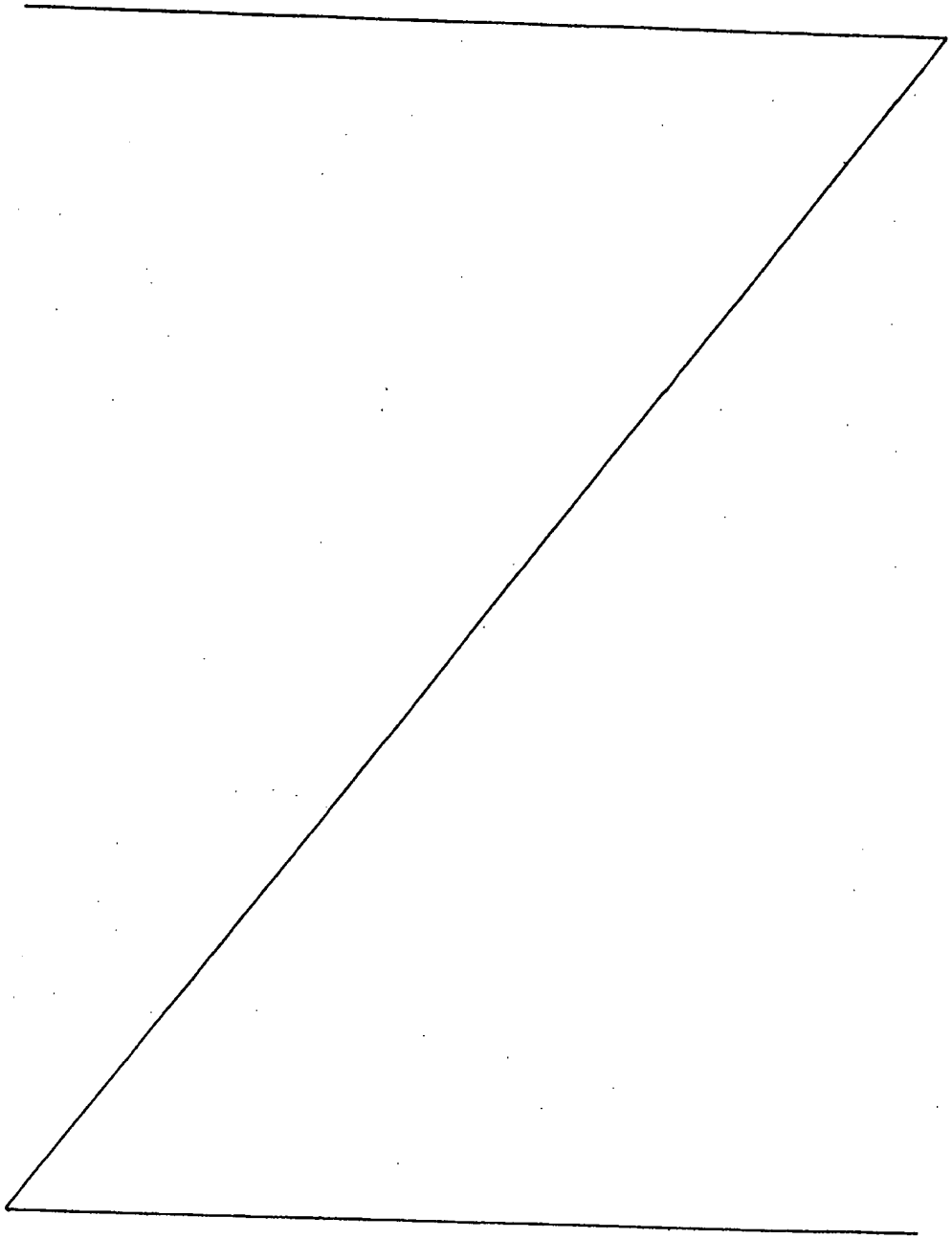
R^5 is C_1-C_6-alkyl;

R^6 is hydrogen or C_1-C_6-alkyl;

or one of its environmentally compatible salts;

and

B) a synergistically effective amount of at least one herbicidal compound from the group of the acetyl-CoA carboxylase inhibitors (ACC), acetolactate synthase inhibitors (ALS), amides, auxin herbicides, auxin transport inhibitors, carotenoid biosynthesis inhibitors, enolpyruvylshikimate 3-phosphate



synthase inhibitors (ESPS), glutamine synthetase inhibitors, lipid biosynthesis inhibitors, mitosis inhibitors, protoporphyrinogen IX oxidase inhibitors, photosynthesis inhibitors, synergists, growth substances, cell wall biosynthesis inhibitors and a variety of other herbicides.

The invention furthermore relates to herbicidal compositions comprising a herbicidally active amount of a synergistic herbicidal mixture as defined above and at least one liquid and/or solid carrier and, if desired, at least one surfactant.

Moreover, the invention relates to processes for the preparation of these compositions and to a method of controlling undesirable vegetation.

In crop protection products, it is always desirable to increase the specific activity of an active ingredient and the reliability of action. It is an object of the present invention to increase the activity of known, herbicidally active 3-heterocyclyl-substituted benzoyl derivatives of the formula I.

It is an object of the present invention to increase the selective herbicidal activity of the 3-heterocyclyl substituted benzoyl derivatives of the formula I against undesirable harmful plants.

We have found that this object is achieved by the mixtures defined at the outset. We have furthermore found herbicidal compositions which comprise these mixtures, processes for their preparation, and methods of controlling undesirable vegetation. In the last-mentioned cases, it is irrelevant whether the herbicidally active compounds of the components A) and B) are formulated and applied jointly or separately and in which sequence they are applied in the case of separate application.

The mixtures according to the invention show a synergistic effect; the compatibility of the herbicidally active compounds of components A) and B) for certain crop plants is generally retained.

Suitable components B are, as acetyl-CoA carboxylase inhibitors (ACC), for example, cyclohexenone oxime ethers, phenoxyphenoxypropionic esters or arylaminopropionic acids. The acetolactate synthase inhibitors (ALS) include, inter alia,

imidazolinones, pyrimidyl ethers, sulfonamides or sulfonyl ureas. Relevant auxin herbicides are, inter alia, pyridine carboxylic acids, 2,4-D or benazolin. Lipid biosynthesis inhibitors which are used are, inter alia, anilides, chloroacetanilides, thioureas, benfuresate or perfluidone. Suitable mitosis inhibitors are, inter alia, carbamates, dinitroanilines, pyridines, butamifos, chlorthal-dimethyl (DCPA) or maleic hydrazide. Examples of protoporphyrinogen IX oxidase inhibitors are, inter alia, diphenyl ethers, oxadiazoles, cyclic imides or pyrazoles. Suitable photosynthesis inhibitors are, inter alia, propanil, pyridate, pyridafol, benzothiadiazinones, dinitrophenols, dipyridylenes, ureas, phenols, chloridazon, triazine, triazinone, uracils or biscarbamates. The synergists are, inter alia, oxiranes. Examples of suitable growth substances are aryloxyalkanoic acids, benzoic acids or quinolinecarboxylic acids. The group "various other herbicides" is to be understood as meaning, inter alia, the classes of the active ingredients dicloropropionic acids, dihydrobenzofurans, phenylacetic acids and individual herbicides mentioned below whose mechanism of action is not (fully) understood.

Other suitable components B are active compounds selected from the group of the amides, auxin transport inhibitors, carotenoic biosynthesis inhibitors, enolpyruvylshikimate 3-phosphate synthase inhibitors (EPSPS), glutamine synthetase inhibitors and cell wall synthesis inhibitors.

Examples of herbicides which can be used in combination with the 3-heterocyclyl-substituted benzoyl derivatives of formula I according to the present invention are, inter alia:

B1 acetyl-CoA carboxylase inhibitors (ACC), for example

- cyclohexenone oxime ethers, such as alloxydim, clethodim, cloproxydim, cycloxydim, sethoxydim, tralkoxydim, butroxydim, clefoxydim or tepraloxydim;
- phenoxyphenoxypropionic esters, such as clodinafop-propargyl (and, if appropriate, cloquintocet), cyhalofop-butyl, diclofop-methyl, fenoxaprop-ethyl, fenoxaprop-P-ethyl, fenthiapropethyl, fluazifop-butyl, fluazifop-P-butyl, haloxyfop-ethoxyethyl, haloxyfop-methyl, haloxyfop-P-methyl, isoxapyrifop, propaquizafop, quizalofop-ethyl, quizalofop-P-ethyl or quizalofop-tefuryl; or
- arylaminopropionic acids, such as

flamprop-methyl or flamprop-isopropyl;

B2 acetolactate synthase inhibitors (ALS), for example
- imidazolinones, such as imazapyr, imazaquin, imazamethabenz-methyl (imazame), imazamoc, imazapic, imazethapyr or imazamethapyr;
- pyrimidyl ethers, such as pyrithiobac-acid, pyrithiobac-sodium, bispyribac-sodium, KIH-6127 or pyribenzoxym;
- sulfonamides, such as florasulam, flumetsulam or metosulam; or
- sulfonylureas, such as amidosulfuron, azimsulfuron, bensulfuron-methyl, chlorimuron-ethyl, chlorsulfuron, cinosulfuron, cyclosulfamuron, ethametsulfuron-methyl, ethoxysulfuron, flazasulfuron, halosulfuron-methyl, imazosulfuron, metsulfuron-methyl, nicosulfuron, primisulfuron-methyl, prosulfuron, pyrazosulfuron-ethyl, rimsulfuron, sulfometuron-methyl, thifensulfuron-methyl, triasulfuron, tribenuron-methyl, triflusulfuron-methyl, N-[[[4-methoxy-6-(trifluoromethyl)-1,3,5-triazin-2-yl]amino]carbonyl]-2-(trifluoromethyl)-benzenesulfonamide, sulfosulfuron or idosulfuron;

B3 amides, for example
- allidochlor (CDAA), benzoylprop-ethyl, bromobutide, chlorthiamid, diphenamid, etobenzanid (benzchlomet), fluthiamide, fosamin or monalide;

B4 auxin herbicides, for example
- pyridinecarboxylic acids, such as clopyralid or picloram; or
- 2,4-D or benazolin;

B5 auxin transport inhibitors, for example
- naptalame or diflufenzopyr;

B6 carotenoid biosynthesis inhibitors, for example
- benzofenap, clomazone (dimethazone), diflufenican, fluorochloridone, fluridone, pyrazolynate, pyrazoxyfen, isoxaflutole, isoxachlortole, mesotrione, sulcotrione (chlormesulone), ketospiradox, flurtamone, norflurazon or amitrol;

B7 enolpyruvylshikimate-3-phosphate synthase inhibitors (ESPS), for example
- glyphosate or sulfosate;

B8 glutamine synthetase inhibitors, for example
- bilanafos (bialaphos) or glufosinate-ammonium;

B9 lipid biosynthesis inhibitors, for example
- anilides, such as anilofos or mefenacet;
- chloroacetanilides, such as dimethenamid, S-dimethenamid, acetochlor, alachlor, butachlor, butenachlor, diethatyl-ethyl, dimethachlor, metazachlor, metolachlor, S-metolachlor, pretilachlor, propachlor, prynachlor, terbuchlor, thenylchlor or xylachlor;
- thioureas, such as butylate, cycloate, di-allate, dimepiperate, EPTC, esprocarb, molinate, pebulate, prosulfocarb, thiobencarb (benthiocarb), tri-allate or vernolate; or
- benfuresate or perfluidone;

B10 mitosis inhibitors, for example
- carbamates, such as asulam, carbetamid, chlorpropham, orbencarb, pronamid (propyzamid), propham or tiocarbazil;
- dinitroanilines, such as benefin, butralin, dinitramin, ethalfluralin, fluchloralin, oryzalin, pendimethalin, prodiamine or trifluralin;
- pyridines, such as dithiopyr or thiazopyr; or
- butamifos, chlorthal-dimethyl (DCPA) or maleic hydrazide;

B11 protoporphyrinogen IX oxidase inhibitors, for example
- diphenyl ethers, such as acifluorfen, acifluorfen-sodium, aclonifen, bifenox, chlornitrofen (CNP), ethoxyfen, fluorodifen, fluoroglycofen-ethyl, fomesafen, furyloxyfen, lactofen, nitrofen, nitrofluorfen or oxyfluorfen;
- oxadiazoles, such as oxadiargyl or oxadiazon;
- cyclic imides, such as azafenidin, butafenacil, carfentrazone-ethyl, cinidon-ethyl, flumiclorac-pentyl, flumioxazin, flumipropyn, flupropacil, fluthiacet-methyl, sulfentrazone or thidiazimin; or
- pyrazoles, such as ET-751, JV 485 or nipyraclofen;

B12 photosynthesis inhibitors, for example

- propanil, pyridate or pyridafol;
- benzothiadiazinones, such as bentazone;
- dinitrophenols, for example bromofenoxim, dinoseb, dinoseb-acetate, dinoterb or DNOC;
- dipyridylenes, such as cyperquat-chloride, difenzoquat-methylsulfate, diquat or paraquat-dichloride;
- ureas, such as chlorbromuron, chlorotoluron, difenoxuron, dimefuron, diuron, ethidimuron, fenuron, fluometuron, isoproturon, isouron, linuron, methabenzthiazuron, methazole, metobenzuron, metoxuron, monolinuron, neburon, siduron or tebuthiuron;
- phenols, such as bromoxynil or ioxynil;
- chloridazon;
- triazines, such as ametryn, atrazine, cyanazine, desmetryn, dimethamethryn, hexazinone, prometon, prometryn, propazine, simazine, simetryn, terbumeton, terbutryn, terbutylazine or trietazine;
- triazinones, such as metamitron or metribuzin;
- uracils, such as bromacil, lenacil or terbacil; or
- biscarbamates, such as desmedipham or phenmedipham;

B13 synergists, for example
- oxiranes, such as tridiphane;

B14 growth substances, for example
- aryloxyalkanoic acids, such as 2,4-DB, clomeprop, dichlorprop, dichlorprop-P (2,4-DP-P), fluoroxypyr, MCPA, MCPB, mecoprop, mecoprop-P or triclopyr;
- benzoic acids, such as chloramben or dicamba; or
- quinolinecarboxylic acids, such as quinclorac or quinmerac;

B15 cell wall synthesis inhibitors, for example
- isoxaben or dichlobenil;

B16 various other herbicides, for example
- dichloropropionic acids, such as dalapon;
- dihydrobenzofurans, such as ethofumesate;
- phenylacetic acids, such as chlorfenac (fenac); or
- aziprotryn, barban, bensulide, benzthiazuron, benzofluor, buminafos, buthidazole, buturon, cafenstrole, chlorbufam, chlorfenprop-methyl, chloroxuron, cinmethylin, cumyluron, cycluron, cyprazine, cyprazole, dibenzyluron, dipropetryn, dymron, eglinazin-ethyl, endothall, ethiozin,

flucabazone, fluorbentranil, flupoxam, isocarbamid, isopropalin, karbutilate, mefluidide, monuron, napropamide, napropanilide, nitralin, oxaciclomefone, phenisopham, piperophos, procyazine, profluralin, pyributicarb, secbumeton, sulfallate (CDEC), terbucarb, triaziflam, triazofenamid or trimeturon;

or their environmentally compatible salts.

Of particular importance are the following herbicides which can be used in combination with the 3-heterocyclyl-substituted benzoly [sic] derivatives of the formula I according to the present invention:

B1 acetyl-CoA carboxylase inhibitors (ACC), for example

- cyclohexenone oxime ethers, such as alloxydim, clethodim, cloproxydim, cycloxydim, sethoxydim, tralkoxydim, butroxydim, clefoxydim or tepraloxydim;
- phenoxyphenoxypropionic esters, such as clodinafop-propargyl (and, if appropriate, cloquintocet), cyhalofop-butyl, diclofop-methyl, fenoxaprop-ethyl, fenoxaprop-P-ethyl, fenthiaprop-ethyl, fluazifop-butyl, fluazifop-P-butyl, haloxyfop-ethoxyethyl, haloxyfop-methyl, haloxyfop-P-methyl, isoxapyrifop, propaquizafop, quizalofop-ethyl, quizalofop-P-ethyl or quizalofop-tefuryl; or
- arylaminopropionic acids, such as flamprop-methyl or flamprop-isopropyl;

B2 acetolactate synthase inhibitors (ALS), for example

- imidazolinones, such as imazapyr, imazaquin, imazamethabenz-methyl (imazame), imazapic, imazethapyr or imazamethapyr;
- pyrimidyl ethers, such as pyrithiobac-acid, pyrithiobac-sodium, bispyribac-sodium, KIH-6127 or pyribenzoxym;
- sulfonamides, such as flumetsulam or metosulam; or
- sulfonylureas, such as amidosulfuron, azimsulfuron, bensulfuron-methyl, chlorimuron-ethyl, chlorsulfuron, cinosulfuron, cyclosulfamuron, ethametsulfuron-methyl, ethoxysulfuron, flazasulfuron, halosulfuron-methyl, imazosulfuron, metsulfuron-methyl, nicosulfuron, primisulfuron-methyl, prosulfuron, pyrazosulfuron-ethyl, rimsulfuron, sulfometuron-methyl, thifensulfuron-methyl, triasulfuron, tribenuron-methyl, triflusulfuron-methyl, N-[[[4-methoxy-6-(trifluoromethyl)-1,3,5-triazin-2-

yl]amino]carbonyl]-2-(trifluoromethyl)benzenesulfonamide, sulfosulfuron or idosulfuron;

B3 amides, for example
- allidochlor (CDAA), benzoylprop-ethyl, bromobutide, chlorthiamid, diphenamid, etobenzanid (benzchlomet), fluthiamide, fosamine or monalide;

B4 auxin herbicides, for example
- pyridinecarboxylic acids, such as clopyralid or picloram; or
- 2,4-D or benazolin;

B5 auxin transport inhibitors, for example
- naptalame or diflufenzopyr;

B6 carotenoid biosynthesis inhibitors, for example
- benzofenap, clomazone (dimethazone), diflufenican, fluorochloridone, fluridone, pyrazolynate, pyrazoxyfen, isoxaflutole, isoxachlortole, mesotrione, sulcotrione (chlormesulone), flurtamone, norflurazon or amitrol;

B7 enolpyruvylshikimate 3-phosphate synthase inhibitors (ESPS), for example
- glyphosate or sulfosate;

B8 glutamine synthetase inhibitors, for example
- bilanafos (bialaphos) or glufosinate-ammonium;

- anilides, such as anilofos or mefenacet;
- chloracetanilides, such as dimethenamid, S-dimethenamid, acetochlor, alachlor, butachlor, butenachlor, diethatyl-ethyl, dimethachlor, metazachlor, metolachlor, S-metolachlor, pretilachlor, propachlor, prynachlor, terbuchlor, thenylchlor or xylachlor;
- thioureas, such as butylate, cycloate, di-allate, dimepiperate, EPTC, esprocarb, molinate, pebulate, prosulfocarb, thiobencarb (benthiocarb), tri-allate or vernolate; or
- benfuresate or perfluidone;

B10 mitosis inhibitors, for example
- carbamates, such as asulam, carbetamide, chlorpropham, orbencarb, pronamide (propyzamide), propham or thiocarbazil;

- dinitroanilines, such as benefin, butralin, dinitramine, ethalfluralin, fluchloralin, oryzalin, pendimethalin, prodiamine or trifluralin;
- pyridines, such as dithiopyr or thiazopyr; or
- butamifos, chlorthal-dimethyl (DCPA) or maleic hydrazide;

B11 protoporphyrinogen IX oxidase inhibitors, for example

- diphenyl ethers, such as acifluorfen, acifluorfen-sodium, aclonifen, bifenox, chlornitrofen (CNP), ethoxyfen, fluorodifen, fluoroglycofen-ethyl, fomesafen, furyloxyfen, lactofen, nitrofen, nitrofluorfen or oxyfluorfen;
- oxadiazoles, such as oxadiargyl or oxadiazon;
- cyclic imides, such as azafenidin, carfentrazone-ethyl, cinidon-ethyl, flumiclorac-pentyl, flumioxazin, flumipropyn, flupropacil, fluthiacet-methyl, sulfentrazone or thidiazimin; or
- pyrazoles, such as ET-751, JV 485 or nipyraclofen;

B12 photosynthesis inhibitors, for example

- propanil, pyridate;
- benzothiadiazinones, such as bentazon;
- dinitrophenols, such as bromofenoxim, dinoseb, dinoseb-acetate, dinoterb or DNOC;
- dipyridylenes, such as cyperquat-chloride, difenzoquat-methylsulfate, diquat or paraquat-dichloride;
- ureas, such as chlorbromuron, chlorotoluron, difenoxuron, dimefuron, diuron, ethidimuron, fenuron, fluometuron, isoproturon, isouron, linuron, methabenzthiazuron, methazole, metobenzuron, metoxuron, monolinuron, neburon, siduron or tebuthiuron;
- phenols, such as bromoxynil or ioxynil;
- chloridazon;
- triazines, such as ametryn, atrazine, cyanazine, desmetryn, dimethamethryn, hexazinone, prometon, prometryn, propazin, simazine, simetryn, terbumeton, terbutryn, terbutylazine or trietazine;
- triazinones, such as metamitron or metribuzin;
- uracils, such as bromacil, lenacil or terbacil; or
- biscarbamates, such as desmedipham or phenmedipham;

B13 synergists, for example

- oxiranes, such as tridiphane;

B14 growth substances, for example

- aryloxyalkanoic acids, such as 2,4-DB, clomeprop, dichlorprop, dichlorprop-P (2,4-DP-P), fluoroxypyr, MCPA, MCPB, mecoprop, mecoprop-P or triclopyr;
- benzoic acids, such as chloramben or dicamba; or
- quinolinecarboxylic acids, such as quinclorac or quinmerac;

B15 cell wall synthesis inhibitors, for example
- isoxaben or dichlobenil;

B16 various other herbicides, for example
- dichloropropionic acids, such as dalapon;
- dihydrobenzofurans, such as ethofumesate;
- phenylacetic acids, such as chlorfenac (fenac); or
- aziprotryn, barban, bensulide, benzthiazuron, benzofluor, buminafos, buthidazole, buturon, cafenstrole, chlorbufam, chlorfenprop-methyl, chloroxuron, cinmethylin, cumyluron, cycluron, cyprazine, cyprazole, dibenzyluron, dipropetryn, dymron, eglinazin-ethyl, endothall, ethiozin, flucabazone, fluorbentranil, flupoxam, isocarbamid, isopropalin, karbutilate, mefluidide, monuron, napropamide, napropanilide, nitralin, oxaciclomefone, phenisopham, piperophos, procyazine, profluralin, pyributicarb, secbumeton, sulfallate (CDEC), terbucarb, triazofenamid or trimeturon;

or their environmentally compatible salts.

The 3-heterocyclyl-substituted benzoyl derivatives of the formula I are disclosed in WO 96/26206, WO 97/41116, WO 97/41117 and WO 97/41118.

They can exist, or be used, in the form of the pure enantiomers and also as racemates or diastereomer mixtures. The 3-heterocyclyl-substituted benzoyl derivatives of the formula I and the herbicidally active compounds from amongst groups B1 to B16 may also exist in the form of their environmentally compatible salts. Suitable salts are, in general, the salts of those cations, or the acid addition salts of those acids, whose cations, or anions, respectively, do not adversely affect the herbicidal action of the active ingredients.

Suitable cations are, in particular, ions of the alkali metals, preferably lithium, sodium and potassium, of the alkaline earth metals, preferably calcium and magnesium, and of the transition metals, preferably manganese, copper, zinc and iron, and also ammonium, it being possible in this case, if desired, for one to

four hydrogen atoms to be replaced by C_1-C_4-alkyl, hydroxy-C_1-C_4-alkyl, C_1-C_4-alkoxy-C_1-C_4-alkyl, hydroxy-C_1-C_4-alkoxy-C_1-C_4-alkyl, phenyl or benzyl, preferably ammonium, dimethylammonium, diisopropylammonium, tetramethylammonium, tetrabutylammonium, 2-(2-hydroxyeth-1-oxy)eth-1-yl ammonium, di(2-hydroxyeth-1-yl)ammonium, trimethylbenzylammonium, furthermore phosphonium ions, sulfonium ions, preferably tri(C_1-C_4-alkyl)sulfonium and sulfoxonium ions, preferably, tri(C_1-C_4-alkyl)sulfoxonium.

Anions of suitable acid addition salts are mainly chloride, bromide, fluoride, hydrogen sulfate, sulfate, dihydrogen phosphate, hydrogen phosphate, nitrate, hydrogen carbonate, carbonate, hexafluorosilicate, hexafluorophosphate, benzoate and the anions of C_1-C_4-alkanoic acids, preferably formate, acetate, propionate and butyrate.

The herbicidally active compounds from amongst groups B1 to B16 are described, for example, in

- "Herbizide [Herbicides]", Hock, Fedtke, Schmidt, 1st edition, Thieme 1995 (s. "quinclorac" p. 238, "molinat" p. 32, "butachlor" p. 32, "pretilachlor" p. 32, "dithiopyr" p. 32, "mefenacet" p. 32, "fenoxapropethyl" p. 216, "dimepiperate" p. 32, "pyrazolynate" p. 146, "pyrazoxyfen" p. 146, "bensulfuronmethyl" p. 31, "pyrazosulfuron-ethyl" p. 31, "cinosulfuron" p. 31, "benfuresate" p. 233, "bromobutide" p. 243, "dymron" p. 243, "dimethyametryn" p. 118, "esprocarb" p. 229, "pyributicarb" p. 32, "cinemthylin" p. 32, "propanil" p. 32, "2,4-D" p. 30, "bentazon" p. 30, "azimsulfuron (DPX-A-8947)" p. 175, "mecoprop-P" p. 237, "chlorpropham" p. 205, "ethoxyfen" p. 30, "haloxyfop-P-methyl" p. 38, "haloxyfop-ethoxyethyl" p. 38, "flumiclorac-pentyl" p. 35, "flupropacil" p. 143, "nipyraclofen" p. 145, "metosulam" p. 33, "ethametsulfuron-methyl" p. 36, "thifensulfuron-methyl" p. 35, "pyrithiobac acid" p. 181);

- "Agricultural Chemicals", Book II Herbicides, 1993 (s. "thiobencarb" p. 85, "benzofenap" p. 221, "napropanilid" p. 49, "piperophos" p. 102, "anilofos" p. 241, "imazosulfuron (TH-913)" p. 150, "etobenzamid (HW-52)" p. 54, "sulcotrione (ICIA-0051)" p. 268, "poast" p. 253, "focus" p. 222, "dimethenamid" p. 48, "sulfosate" p. 236, "2,4-DB" p. 10, "dichlorprop-P" p. 6, "flupoxam" p. 44, "prosulfocarb" p. 84, "quinmerac" p. 233, "metazachlor" p. 64, "flurtamone" p. 265,

"bromofenoxim" p. 228, "fomesafen" p. 248, "imazamethabenz-methyl" p. 153, "clodinafop-propargyl" p. 214, "fenoxaprop-P-ethyl" p. 208, "fluazifop-P-butyl" p. 207, "quizalofop-P-ethyl" p. 210, "quizalofop-terfuryl" p. 211, "flumioxazin" p. 43, "flumipropyn" p. 267, "sulfentrazone" p. 261, "thiazopyr" p. 226, "pyrithiobac-sodium" p. 266, "flumetsulam" p. 227, "amidosulfuron" p. 151, "halosulfuron-methyl" p. 148, "rimsulfuron" p. 138, "tribenuron-methyl" p. 139, "triflusulfuron-methyl" p. 137, "primisulfuron-methyl" p. 147);

- "Agricultural Chemicals", Book II Herbicides, 13th Edition (s. "carfenstole" p. 284, "sulfosulfuron" p. 145, "ethoxysulfuron" p. 149, "pyribenzoxym" p. 279, "diflufenzopyr" p. 90, "ET-751" p. 278, "carfentrazone-ethyl" p. 267, "fluthiacet-methyl" p. 277, "imazapic" p. 160, "butenachlor" p. 54, "tiocarbazil" p. 84, "fluthiamide" p. 62, "isoxaflutole" p. 283, "butroxydim" p. 259,)

- "Short Review of Herbicides & PGRs 1991, Hodogaya Chemicals (s. "furyloxyfen" p. 142, "triazofenamid" p. 268, "thenylchlorid (NSK-850)" p. 52, "cumyluron (JC-940)" p. 90, "pendimethalin (AC-92553)" p. 58, "buthidazole" p. 88, "cyprazole" p. 38, "allidochlor" p. 48, "benzoylprop-ethyl" p. 38, "chlorthiamid" p. 150, "diphenamid" p. 34, "flamprop-methyl" p. 40, "fosamin" p. 232, "isoxaben" p. 42, "monalide" p. 32, "naptalam" p. 36, "pronamid" p. 34, "bialaphos" p. 234, "glufosinate-ammonium" p. 234, "glyphosate" p. 232, "amitrol" p. 254, "clomeprop p. 20, "dichlorprop" p. 6, "fenoprop" p. 8, "fluroxypyr" p. 156, "MCPA" p. 4, "MCPB" p. 8, "mecoprop" p. 6, "napropamide" p. 16, "triclopyr" p. 154, "chloramben" p. 28, "dicamba" p. 26, "clomazone" p. 268, "diflufenican" p. 42, "fluorochloridone" p. 266, "fluridone" p. 156, "asulam" p. 112, "barban" p. 100, "butylate" p. 106, "carbetamide" p. 36, "chlorobufam" p. 100, "cycloate" p. 108, "desmedipham" p. 104, "di-allate" p. 106, "EPTC" p. 108, "orbencarb" p. 112, "pebulate" p. 106, "phenisopham" p. 118, "phenmedipham" p. 104, "propham" p. 100, "sulfallate" p. 110, "terbucarb" p. 102, "tri-allate" p. 108, "vernolate" p. 108, "acetochlor" p. 48, "alachlor" p. 46, "diethathyl-ethyl" p. 48, "dimethachlor" p. 50, "metolachlor" p. 46, "propachlor" p. 44, "pyrnachlor" p. 44, "terbuchlor" p. 48, "xylachlor" p. 52, "alloxydim" p. 260, "clethodim" p. 270, "cloproxydim" p. 268, "tralkoxydim" p. 270, "dalapon" p. 212, "ethofumesate" p. 124, "benefin" p. 54, "butralin" p. 58,

"dinitramin" p. 56, "ethalfluralin" p. 60, "fluchloralin" p. 54, "isopropalin" p. 58, "nitralin" p. 58, "oryzalin" p. 60, "prodiamine" p. 62, "profluralin" p. 54, "trifluralin" p. 54, "dinoseb" p. 128, "dinoseb-acetate" p. 128, "dinoterb" p. 128, "DNOC" p. 126, "acifluorfen-sodium" p. 142, "aclonifen" p. 146, "bifenox" p. 140, "chlornitrofen" p. 138, "difenoxuron" p. 76, "fluorodifen" p. 138, "fluoroglycofen-ethyl" p. 146, "lactofen" p. 144, "nitrofen" p. 136, "nitrofluorfen" p. 140, "oxyfluorfen" p. 140, "cyperquat-chloride" p. 158, "difenzoquat-methylsulfate" p. 160, "diquat" p. 158, "paraquat-dichloride" p. 158, "benzthiazuron" p. 82, "buturon" p. 66, "chlorbromuron" p. 72, "chloroxuron" p. 76, "chlorotoluron" p. 74, "cycluron" p. 84, "dimefuron" p. 88, "diuron" p. 70, "ethidimuron" p. 86, "fenuron" p. 64, "fluometuron" p. 68, "isoproturon" p. 80, "isouron" p. 88, "karbutilate" p. 76, "linuron" p. 72, "methabenzthiazuron" p. 82, "metoxuron" p. 72, "monolinuron" p. 66, "monuron" p. 64, "neburon" p. 72, "siduron" p. 68, "tebuthiuron" p. 86, "trimeturon" p. 64, "isocarbamid" p. 168, "imazamethapyr" p. 172, "imazapyr" p. 170, "imazaquin" p. 170, "imazethapyr" p. 172, "methazole" p. 162, "oxadiazon" p. 162, "tridiphane" p. 266, "bromoxynil" p. 148, "ioxynil" p. 148, "diclofop-methyl" p. 16, "fenthiaprop-ethyl" p. 20, "fluazifop-butyl" p. 18, "haloxyfop-methyl" p. 18, "isoxapyrifop" p. 22, "propaquizafop" p. 24, "quizalofop-ethyl" p. 20, "chlorfenac" p. 258, "chlorfenprop-methyl" p. 258, "chloridazon" p. 174, "maleic hydrazide" p. 162, "norflurazon" p. 174, "pyridate" p. 176, "clopyralid" p. 154, "picloram" p. 154, "chlorimuron-ethyl" p. 92, "chlorsulfuron" p. 92, "flazasulfuron" p. 96, "metsulfuron-methyl" S.92, "nicosulfuron" p. 96, "sulfometuron-methyl" p. 92, "triasulfuron" p. 94, "ametryn" p. 198, "atrazine" p. 188, "aziprotryne" p. 206, "cyanazine" p. 192, "cyprazine" p. 192, "desmetryne" p. 200, "dipropetryn" p. 202, "eglinazine-ethyl" p. 208, "hexazinone" p. 208, "procyazine" p. 192, "prometone" p. 196, "prometryn" p. 196, "propazine" p. 188, "secbumeton" p. 196, "simazine" p. 188, "simetryn" p. 196, "terbumeton" p. 204, "terbutryn" p. 198, "terbutylazine" p. 190, "trietazine" p. 188, "ethiozine" p. 210, "metamitron" p. 206, "metribuzin" p. 202, "bromacil" p. 180, "lenacil" p. 180, "terbacil" p. 180, "benazolin" p. 262, "bensulide" p. 228, "benzofluor" p. 266, "butamifos" p. 228, "DCPA" p. 28, "dichlobenil" p. 148, "endothal" p. 264, "mefluidide" p. 306, "perfluidone" p. 260, "terbuchlor" p. 48);

- "Global Herbicide Directory" First Edition, 1994 (s. "oxadiargyl" p. 96);

- "European Directory of Agrochemical Products" Volume 2 - Herbicides" Fourth Edition, (s. "buminafos" p. 255).

Moreover, the compound "DEH-112" is disclosed in European Patent Application EP-A 302 203. The compound "tepraloxydim" is described in DE-A 33 36 140; the compound "cinidon-ethyl" in DE-A 36 03 789 and the compound "fluorbentranil" in EP-A 84 893. Other compounds are known from "Brighton Crop Protection Conference - Weeds - 1993 (S. "thidiazimin" p. 29, "AC-322140" p. 41, "KIH-6127" p. 47, "prosulfuron" p. 53, "KIH-2023" p. 61, "metobenzuron" p. 67). The compound "carfenstrole (CH-900)" is mentioned in EP-A 332 133, and the compound N-[[[4-methoxy-6-(trifluoromethyl)-1,3,5-triazin-2-yl]amino]-carbonyl]-2-(trifluoromethylbenzenesulfonamide) is described in PCT/EP 96/03996.

The assignment of the active ingredients to the respective mechanisms of action is based on current knowledge. If several mechanisms of action apply to one active ingredient, this substance was only assigned to one mode of action.

Preferred with regard to the synergistic herbicidal action of the mixtures according to the invention are those 3-heterocyclyl-substituted benzoyl derivatives of the formula I in which the variables have the following meanings, either alone or in combination:

R^1 halogen, C_1-C_6-alkyl, C_1-C_6-alkylthio, C_1-C_6-alkylsulfinyl or C_1-C_6-alkylsulfonyl;
especially preferably halogen, such as chlorine or bromine, C_1-C_6-alkyl, such as methyl or ethyl, or C_1-C_6-alkylsulfonyl, such as methylsulfonyl or ethylsulfonyl;
very particularly preferably chlorine, methyl or methylsulfonyl;

R^2 a heterocyclic radical selected from the group: isoxazol-3-yl, isoxazol-5-yl and 4,5-dihydroisoxazol-3-yl, it being possible for the three radicals mentioned to be unsubstituted or mono- or polysubstituted by halogen, C_1-C_4-alkyl, C_1-C_4-alkoxy, C_1-C_4-haloalkyl, C_1-C_4-haloalkoxy or C_1-C_4-alkylthio;
especially preferably isoxazol-5-yl, 3-methyl-isoxazol-5-yl, 4,5-dihydroisoxazol-3-yl, 5-methyl-4,5-dihydroisoxazol-yl, 5-ethyl-4,5-dihydroisoxazol-3-yl or

4,5-dimethyl-4,5-dihydroisoxazol-3-yl;
also preferred is a heterocyclic radical selected from the group: thiazol-2-yl, thiazol-4-yl, thiazol-5-yl, isoxazol-4-yl, 4,5-dihydroisoxazol-4-yl and 4,5-dihydroisoxazol-5-yl, it being possible for the six radicals mentioned to be unsubstituted or mono- or polysubstituted by halogen, C_1-C_4-alkyl, C_1-C_4-alkoxy, C_1-C_4-haloalkyl, C_1-C_4-haloalkoxy or C_1-C_4-alkylthio;

R^3 halogen, C_1-C_6-alkyl, C_1-C_6-alkylthio, C_1-C_6-alkylsulfinyl or C_1-C_6-alkylsulfonyl;
especially preferably halogen, such as chlorine or bromine, C_1-C_6-alkylthio, such as methylthio or ethylthio, C_1-C_6-alkylsulfinyl, such as methylsulfinyl or ethylsulfinyl, or C_1-C_6-alkylsulfonyl, such as methylsulfonyl or ethylsulfonyl;
very particularly preferably chlorine, methylsulfonyl or ethylsulfonyl;

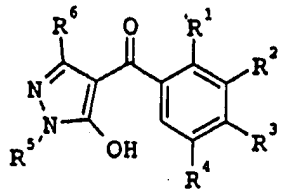
R^4 hydrogen or methyl;
especially preferably hydrogen;

R^5 is C_1-C_6-alkyl, such as methyl, ethyl, propyl, 1-methylethyl, butyl, 1-methylpropyl or 2-methylpropyl;
especially preferably methyl, ethyl or 1-methylethyl;

R^6 hydrogen or C_1-C_6 alkyl, such as methyl or ethyl;
especially preferably hydrogen or methyl.

Very particularly preferred are those 3-heterocyclyl-substituted benzoyl derivatives of the formula Ia, in particular the compounds Ia.1 to Ia.53, which are mentioned in Table 1 which follows:

Table 1

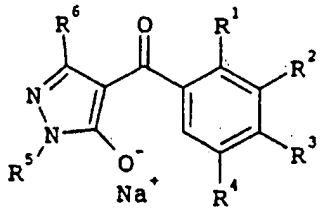


Ia

No.	R^1	R^2	R^3	R^4	R^5	R^6
Ia.1	Cl	4,5-dihydroisoxazol-3-yl	SO_2CH_3	H	CH_3	CH_3
Ia.2	Cl	4,5-dihydroisoxazol-3-yl	Cl	H	CH_3	CH_3
Ia.3	Cl	4,5-dihydroisoxazol-3-yl	SO_2CH_3	H	CH_3	H
Ia.4	Cl	4,5-dihydro-5-methylisoxazol-3-yl	SO_2CH_3	H	CH_3	H
Ia.5	Cl	4,5-dihydro-5,5-dimethylisoxazol-3-yl	SO_2CH_3	H	CH_3	H
Ia.6	Cl	4,5-dihydro-5-ethylisoxazol-3-yl	SO_2CH_3	H	CH_3	H
Ia.7	Cl	4,5-dihydro-5,5-diethylisoxazol-3-yl	SO_2CH_3	H	CH_3	H
Ia.8	Cl	4,5-dihydro-5-chloromethylisoxazol-3-yl	SO_2CH_3	H	CH_3	H
Ia.9	Cl	4,5-dihydroisoxazol-3-yl	SCH_3	H	CH_3	H
Ia.10	Cl	4,5-dihydro-5-ethoxyisoxazol-3-yl	SO_2CH_3	H	CH_3	H
Ia.11	Cl	4,5-dihydro-5-methoxyisoxazol-3-yl	SO_2CH_3	H	CH_3	H
Ia.12	Cl	4,5-dihydro-4,5-dimethylisoxazol-3-yl	SO_2CH_3	H	CH_3	H
Ia.13	Cl	4,5-dihydro-5-thioethylisoxazol-3-yl	SO_2CH_3	H	CH_3	H
Ia.14	Cl	4,5-dihydro-5-trifluoromethylisoxazol-3-yl	SO_2CH_3	H	CH_3	H
Ia.15	SCH_3	4,5-dihydroisoxazol-3-yl	SCH_3	H	CH_3	H
Ia.16	Cl	4,5-dihydroisoxazol-3-yl	SO_2CH_3	H	C_2H_5	H
Ia.17	Cl	4,5-dihydroisoxazol-3-yl	Cl	H	C_2H_5	H
Ia.18	Cl	4,5-dihydro-5-methylisoxazol-3-yl	SO_2CH_3	H	C_2H_5	H
Ia.19	Cl	4,5-dihydro-5,5-dimethylisoxazol-3-yl	SO_2CH_3	H	C_2H_5	H
Ia.20	Cl	4,5-dihydro-5-ethylisoxazol-3-yl	SO_2CH_3	H	C_2H_5	H
Ia.21	Cl	4,5-dihydro-5,5-diethylisoxazol-3-yl	SO_2CH_3	H	C_2H_5	H
Ia.22	Cl	4,5-dihydroisoxazol-3-yl	SCH_3	H	C_2H_5	H
Ia.23	Cl	4,5-dihydro-5-chloromethylisoxazol-3-yl	SO_2CH_3	H	C_2H_5	H
Ia.24	Cl	4,5-dihydroisoxazol-3-yl	$SOCH_3$	H	C_2H_5	H
Ia.25	Cl	4,5-dihydro-5-ethoxyisoxazol-3-yl	SO_2CH_3	H	C_2H_5	H
Ia.26	Cl	4,5-dihydro-4,5-dimethylisoxazol-3-yl	SO_2CH_3	H	C_2H_5	H
Ia.27	Cl	4,5-dihydro-5-thioethylisoxazol-3-yl	SO_2CH_3	H	C_2H_5	H
Ia.28	Cl	4,5-dihydro-5-trifluoromethylisoxazol-3-yl	SO_2CH_3	H	C_2H_5	H
Ia.29	SCH_3	4,5-dihydroisoxazol-3-yl	SCH_3	H	C_2H_5	H
Ia.30	Cl	4,5-dihydroisoxazol-3-yl	SO_2CH_3	H	i-C_4H_9	H
Ia.31	CH_3	4,5-dihydroisoxazol-3-yl	SO_2CH_3	H	CH_3	CH_3
Ia.32	CH_3	4,5-dihydroisoxazol-3-yl	Cl	H	CH_3	CH_3
Ia.33	CH_3	4,5-dihydroisoxazol-3-yl	SO_2CH_3	H	CH_3	H
Ia.34	CH_3	4,5-dihydro-5-methylisoxazol-3-yl	SO_2CH_3	H	CH_3	H
Ia.35	CH_3	4,5-dihydro-5,5-dimethylisoxazol-3-yl	SO_2CH_3	H	CH_3	H

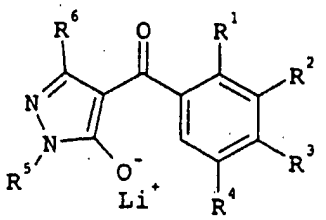
No.	R^1	R^2	R^3	R^4	R^5	R^6
Ia.36	CH_3	4,5-dihydro-5-ethylisoxazol-3-yl	SO_2CH_3	H	CH_3	H
Ia.37	CH_3	4,5-dihydro-5,5-diethylisoxazol-3-yl	SO_2CH_3	H	CH_3	H
Ia.38	CH_3	4,5-dihydroisoxazol-3-yl	SO_2CH_3	H	CH_3	H
Ia.39	CH_3	4,5-dihydro-4,5-dimethylisoxazol-3-yl	SO_2CH_3	H	CH_3	H
Ia.40	CH_3	4,5-dihydroisoxazol-3-yl	SO_2CH_3	H	C_2H_5	H
Ia.41	CH_3	4,5-dihydroisoxazol-3-yl	Cl	H	C_2H_5	H
Ia.42	CH_3	4,5-dihydro-5-methylisoxazol-3-yl	SO_2CH_3	H	C_2H_5	H
Ia.43	CH_3	4,5-dihydro-5,5-dimethylisoxazol-3-yl	SO_2CH_3	H	C_2H_5	H
Ia.44	CH_3	4,5-dihydro-5-ethylisoxazol-3-yl	SO_2CH_3	H	C_2H_5	H
Ia.45	CH_3	4,5-dihydro-5-diethylisoxazol-3-yl	SO_2CH_3	H	C_2H_5	H
Ia.46	CH_3	4,5-dihydro-4,5-dimethylisoxazol-3-yl	SO_2CH_3	H	C_2H_5	H
Ia.47	CH_3	4,5-dihydroisoxazol-3-yl	SO_2CH_3	H	i-C_4H_9	H
Ia.48	Cl	2-thiazolyl	SO_2CH_3	H	CH_3	CH_3
Ia.49	Cl	2-thiazolyl	SO_2CH_3	H	CH_3	H
Ia.50	Cl	2-thiazolyl	SO_2CH_3	H	C_2H_5	H
Ia.51	CH_3	2-thiazolyl	SO_2CH_3	H	CH_3	CH_3
Ia.52	Cl	3-methylisoxazol-5-yl	SO_2CH_3	H	CH_3	H
Ia.53	Cl	3-methylisoxazol-5-yl	SO_2CH_3	H	C_2H_5	H

- Also very particularly preferred are the compounds Ib, in particular the compounds Ib.1 to Ib.53, which differ from the compounds Ia.1 to Ia.53 only by the fact that they are present as the sodium salt:



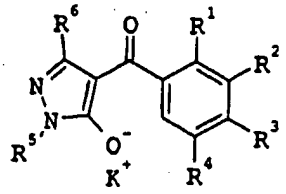
Ib

- Also very particularly preferred are the compounds Ic, in particular the compounds Ic.1 to Ic.53, which differ from the compounds Ia.1 to Ia.53 only by the fact that they are present as the lithium salt:



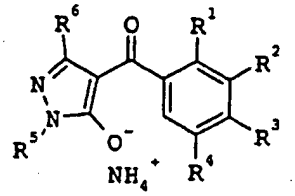
Ic

- Also very particularly preferred are the compounds Id, in particular the compounds Id.1 to Id.53, which differ from the compounds Ia.1 to Ia.53 only by the fact that they are present as the potassium salt:



Id

- Also very particularly preferred are the compounds Ie, in particular the compounds Ie.1 to Ie.53, which differ from the compounds Ia.1 to Ia.53 only by the fact that they are present as the ammonium salt:



Ie

- Very particularly preferred are, especially, the compounds Ia, especially the compounds Ia.1 to Ia.53.

- Very particularly preferred are, moreover, the 3-heterocyclyl substituted benzoyl derivatives of the formula I where R^2 is a heterocyclic radical selected from amongst the group: thiazol-2-yl, thiazol-4-yl and thiazol-5-yl, it being possible for the three radicals mentioned to be unsubstituted or mono- or polysubstituted by halogen, C_1-C_4-alkyl, C_1-C_4-alkoxy, C_1-C_4-haloalkyl, C_1-C_4-haloalkoxy or C_1-C_4-alkylthio.

Very particularly preferred are, especially, the 3-heterocyclyl-substituted benzoyl derivatives of the formula I, where
R^4 is hydrogen.

- Very particularly preferred are, moreover, the 3-heterocyclyl substituted benzoyl derivatives of the formula I where

R^2 is a heterocyclic radical selected from the group:

isoxazol-3-yl, isoxazol-4-yl and isoxazol-5-yl, it being possible for the three radicals mentioned to be unsubstituted or mono- or polysubstituted by halogen, C_1-C_4-alkyl, C_1-C_4-alkoxy, C_1-C_4-haloalkyl, C_1-C_4-haloalkoxy or C_1-C_4-alkylthio.

Very particularly preferred are, especially, the 3-heterocyclyl-substituted benzoyl derivatives of the formula I, where

R^2 is isoxazol-3-yl which can be unsubstituted or mono- or polysubstituted by halogen, C_1-C_4-alkyl, C_1-C_4-alkoxy, C_1-C_4-haloalkyl, C_1-C_4-haloalkoxy or C_1-C_4-alkylthio.

R^4 is hydrogen.

Very especially preferred are also in particular the 3-heterocyclyl-substituted benzoyl derivatives of the formula I where

R^2 is isoxazol-5-yl, which can be unsubstituted or mono- or polysubstituted by halogen, C_1-C_4-alkyl, C_1-C_4-alkoxy, C_1-C_4-haloalkyl, C_1-C_4-haloalkoxy or C_1-C_4-alkylthio;

R^4 is hydrogen.

Most particularly preferred is 4-[2-chloro-3-(3-methyl-isoxazol-5-yl)-4-methylsulfonyl-benzoyl]-1-methyl-5-hydroxy-1H-pyrazole.

Very particularly preferred are, moreover, the 3-heterocyclyl-substituted benzoyl derivatives of the formula I where

R^2 is a heterocyclic radical selected from the group:

4,5-dihydroisoxazol-3-yl, 4,5-dihydroisoxazol-4-yl and 4,5-dihydroisoxazol-5-yl, it being possible for the three radicals mentioned to be unsubstituted or mono- or polysubstituted by halogen, C_1-C_4-alkyl, C_1-C_4-alkoxy, C_1-C_4-haloalkyl, C_1-C_4-haloalkoxy or C_1-C_4-alkylthio.

Very particularly preferred are, especially, the 3-heterocyclyl-substituted benzoyl derivatives of the formula I where

R^2 is 4,5-dihydroisoxazol-3-yl which can be unsubstituted or mono- or polysubstituted by halogen, C_1-C_4-alkyl, C_1-C_4-alkoxy, C_1-C_4-haloalkyl, C_1-C_4-haloalkoxy or C_1-C_4-alkylthio; and

R^4 is hydrogen.

Most particularly preferred are the 3-heterocyclyl-substituted benzoyl derivatives of the formula I where

R^1 is halogen or C_1-C_6-alkyl; and

R^3 is C_1-C_6-alkylsulfonyl.

Most especially preferred is 4-[2-chloro-3-(4,5-dihydroisoxazol-3-yl)-4-methylsulfonyl-benzoyl]-1-methyl-5-hydroxy-1H-pyrazole.

Most particularly preferred is also 4-[2-methyl-3-(4,5-dihydroisoxazol-3-yl)-4-methylsulfonyl-benzoyl]-1-methyl-5-hydroxy-1H-pyrazole.

With a view to the synergistic herbicidal action of the mixtures according to the invention, compounds from amongst groups B1 to B14 or B16, preferably from amongst groups B1 to B14, are preferred as component B).

In particular, compounds from amongst the classes of active ingredients mentioned below are preferred, or the following compounds are very particularly preferred:

B1 acetyl-CoA carboxylase inhibitors (ACC):

- cyclohexenone oxime ethers, in particular cycloxydim, sethoxydim or tralkoxydim, preferably sethoxydim or tralkoxydim; or
- phenoxyphenoxypropionic esters, in particular clodinafop-propargyl (and, if appropriate, cloquintocet), fenoxaprop-ethyl or fenoxaprop-P-ethyl, preferably clodinafop-propargyl (and, if appropriate, cloquintocet) or fenoxaprop-p-ethyl [sic];

B2 acetolactate synthase inhibitors (ALS):

- imidazolinones, in particular imazapyr, imazaquin, imazamethabenz, imazethapyr or imazamoc, preferably imazapyr;
- pyrimidyl ethers, in particular pyrithiobac sodium;

- sulfonamides, in particular florasulam, flumetsulam or metosulam, preferably metosulam; or
- sulfonylureas, in particular halosulfuron-methyl, nicosulfuron, primisulfuron-methyl, prosulfuron, rimsulfuron, thifensulfuron-methyl, tribenuron-methyl, N-[[[4-methoxy-6-(trifluoromethyl)-1,3,5-triazin-2-yl]-amino]carbonyl]-2-(trifluoromethyl)-benzenesulfonamide or sulfosulfuron;

B3 amides:
- fluthiamide;

B4 auxin herbicides:
- pyridinecarboxylic acids, in particular clopyralid; or
- 2,4-D;

B5 auxin transport inhibitors:
- diflufenzopyr;

B6 carotenoid biosynthesis inhibitors:
- isoxaflutole, mesotrione, isoxachloride, ketospiradox or sulcotrione (chlormesulone), in particular isoxaflutole or sulcotrione;

B7 enolpyruvylshikimate-3-phosphate synthase inhibitors (ESPS):
- glyphosate or sulfosate;

B8 glutamin synthetase inhibitors:
- glufosinate-ammonium;

B9 lipid biosynthesis inhibitors:
- chloroacetanilides, in particular dimethenamid, S-dimethenamid, acetochlor, metolachlor or S-metolachlor,
- thioureas, in particular benthiocarb;

B10 mitosis inhibitors:
- dinitroanilines, in particular pendimethalin;

B11 protoporphyrinogen IX oxidase inhibitors:
- diphenyl ethers, in particular acifluorfen or acifluorfen-sodium;
- oxadiazoles, in particular oxadiargyl; or
- cyclic imides, in particular butafenacil, carfentrazone-ethyl, cinidon-ethyl or flumiclorac-pentyl, preferably carfentrazone-ethyl, cinidon-ethyl or flumidorac-pentyl;
- pyrazoles, in particular JV 485;

B12 photosynthesis inhibitors:
- pyridate or pyridafol, in particular pyridate;
- benzothiadiazinones, in particular bentazone;
- dipyridylenes, in particular paraquat-dichloride;
- ureas, in particular diuron or isoproturon, preferably diuron;
- phenols, in particular bromoxynil;
- chloridazone;
- triazines, in particular atrazine or terbutylazine; or
- triazinones, in particular metribuzin;

B13 synergists:
- oxiranes, in particular tridiphane;

B14 growth substances:
- aryloxyalkanoic acids, in particular fluoroxypyr, MCPA or mecoprop-P;
- benzoic acids, in particular dicamba; or
- quinolinecarboxylic acids, in particular quinclorac;

B16 various other herbicides:
- triaziflam.

Also preferred as component B) are compounds from amongst the groups B1, B2, B4 to B12 and B14.

In particular, compounds from amongst the classes of active ingredients mentioned below are preferred, or the following compounds are very particularly preferred:

B1 acetyl-CoA carboxylase inhibitors (ACC):
- cyclohexenone oxime ethers, in particular cycloxydim or sethoxydim;
- phenoxyphenoxypropionic esters, in particular clodinafop-propargyl (and, if appropriate, cloquintocet), fenoxaprop-ethyl or fenoxaprop-P-ethyl, preferably clodinafop-propargyl (and, if appropriate, cloquintocet);

B2 acetolactate synthase inhibitors (ALS):
- imidazolinones, in particular imazapyr, imazaquin, imazamethabenz or imazethapyr, preferably imazapyr;
- pyrimidyl ethers, in particular pyrithiobac-sodium;
- sulfonamides, in particular flumetsulam or metosulam, preferably metosulam; or

- sulfonylureas, in particular halosulfuron-methyl, nicosulfuron or N-[[[4-methoxy-6-(trifluoromethyl)-1,3,5-triazin-2-yl]amino]carbonyl]-2-(trifluoromethyl)-benzenesulfonamide, preferably nicosulfuron or N-[[[4-methoxy-6-(trifluoromethyl)-1,3,5-triazin-2-yl]-amino]carbonyl]-2-(trifluoromethyl)-benzenesulfonamide;

B4 auxin herbicides:
- 2,4-D;

B5 auxin transport inhibitors:
- diflufenzopyr;

B6 carotenoid biosynthesis inhibitors:
- isoxaflutole or sulcotrione, preferably isoxaflutole;

B7 enolpyruvylshikimat-3-phosphate synthase inhibitors (ESPS):
- glyphosate;

B8 glutamine synthetase inhibitors:
- glufosinate-ammonium;

B9 lipid biosynthesis inhibitors:
- chloracetanilide, in particular dimethenamid, S-dimethenamid, acetochlor, metolachlor or S-metolachlor;
- thioureas, in particular benthiocarb;

B10 mitosis inhibitors:
- dinitroaniline, in particular pendimethalin;

B11 protoporphyrinogen IX oxidase inhibitors:
- diphenyl ethers, in particular acifluorfen;
- cyclic imides, in particular carfentrazone-ethyl or cinidon-ethyl, preferably carfentrazone-ethyl;

B12 photosynthesis inhibitors:
- pyridate;
- benzothiadiazinones, in particular bentazone;
- dipyridylenes, in particular paraquat-dichloride;
- ureas, in particular diuron or isobroturon, preferably diuron;
- phenols, in particular bromoxynil;
- chloridazon;
- triazines, in particular atrazine or terbutylazine; or
- triazinones, in particular metribuzin;

B14 growth substances:

- aryloxyalkanoic acids, in particular MCPA;
- benzoic acids, in particular dicamba;
- quinolinecarboxylic acids, in particular quinclorac.

The following embodiments are especially preferred with a view to the synergistic herbicidal action of the mixtures according to the invention:

- In a particular embodiment, the synergistic herbicidal mixture according to the invention comprises, as component A), a 3-heterocyclyl-substituted benzoyl derivative of the formula I, where
  R^2 is a heterocyclic radical selected from the group: isoxazol-3-yl, isoxazol-5-yl and 4,5-dihydroisoxazol-3-yl, the three radicals mentioned being unsubstituted or mono- or polysubstituted by halogen, C_1-C_4-alkyl, C_1-C_4-alkoxy, C_1-C_4-haloalkyl, C_1-C_4-haloalkoxy or C_1-C_4-alkylthio; in particular isoxazol-5-yl, 3-methyl-isoxazol-5-yl, 4,5-dihydroisoxazol-3-yl, 5-methyl-4,5-dihydroisoxazol-3-yl, 5-ethyl-4,5-dihydroisoxazol-3-yl or 4,5-dimethyl-4,5-dihydroisoxazol-3-yl;
  and,
  as component B), at least one herbicidal compound from amongst the groups B1, B2, B4 to B12 and B14; in particular clodinafop (and, if appropriate, cloquintocet), diflufenzopyr, imazethapyr, flumetsulam, pyrithiobac-sodium, nicosulfuron, N-[[[4-methoxy-6-(trifluoromethyl)-1,3,5-triazin-2-yl]amino]-carbonyl]-2-(trifluoromethyl)benzene-sulfonamide, clopyralid, 2,4-D, isoxaflutole, glyphosate, glufosinate-ammonium, dimethenamide, S-dimethenamide, acetochlor, metolachlor, S-metolachlor, pendimethalin, carfentrazone-ethyl, pyridate, bentazone, diuron, bromoxynil, atrazine, terbutylazine, metribuzine or dicamba.

Very particularly preferred are mixtures which comprise, as component A), 4-[2-chloro-3-(4,5-dihydroisoxazol-3-yl)-4-methylsulfonylbenzoyl]-1-methyl-5-hydroxy-1H-pyrazole.

Very particularly preferred are also mixtures which comprise, as component A), 4-[2-methyl-3-(4,5-dihydroisoxazol-3-yl)-4-methylsulfonylbenzoyl]-1-methyl-5-hydroxy-1H-pyrazole.

Very particularly preferred are also mixtures which comprise, as component A), 4-[2-chloro-3-(3-methyl-isoxazol-5-yl)-4-methylsulfonylbenzoyl]-1-methyl-5-hydroxy-1H-pyrazole.

- In another particular embodiment, the synergistic herbicidal mixture according to the invention comprises, as component A), a 3-heterocyclyl-substituted benzoyl derivative of the formula I where

  R^2 is a heterocyclic radical selected from the group: thiazol-2-yl, thiazol-4-yl, thiazol-5-yl, isoxazol-4-yl, 4,5-dihydroisoxazol-4-yl and 4,5-dihydroisoxazol-5-yl, it being possible for the six radicals mentioned to be unsubstituted or mono- or polysubstituted by halogen, C_1-C_4-alkyl, C_1-C_4-alkoxy, C_1-C_4-haloalkyl, C_1-C_4-haloalkoxy or C_1-C_4-alkylthio;

  and, as component B), at least one herbicidal compound from amongst the groups B1, B2, B4 to B12 and B14;
  in particular clodinafop (and, if appropriate, cloquintocet), diflufenzopyr, imazethapyr, flumetsulam, pyrithiobac-sodium, nicosulfuron, N-[[[4-methoxy-6-(trifluoromethyl)-1,3,5-triazin-2-yl]amino]-carbonyl]-2-(trifluoromethyl)benzene-sulfonamide, clopyralid, 2,4-D, isoxaflutole, glyphosate, glufosinate-ammonium, dimethenamide, S-dimethenamide, acetochlor, metolachlor, S-metolachlor, pendimethalin, carfentrazone-ethyl, pyridate, bentazone, diuron, bromoxynil, atrazine, terbutylazine, metribuzine or dicamba.

- In a further particular embodiment, the synergistic herbicidal mixture according to the invention comprises, as component A), a 3-heterocyclyl-substituted benzoyl derivative of the formula I where

  R^2 is a heterocyclic radical selected from the group consisting of 4,5-dihydroisoxazol-3-yl, 4,5-dihydro-isoxazol-4-yl and 4,5-dihydroisoxazol-5-yl, where the three abovementioned radicals may be unsubstituted or mono- or polysubstituted by halogen, C_1-C_4-alkyl, C_1-C_4-alkoxy, C_1-C_4-haloalkyl, C_1-C_4-haloalkoxy or C_1-C_4-alkylthio;

  and as component B) at least one herbicidal compound from amongst the groups B1, B2, B4 to B12 and B14;

- The synergistic herbicidal mixture according to the invention preferably comprises, as component B), at least one herbicidal compound from the following groups:

B1 acetyl-CoA carboxylase inhibitors (ACC): cyclohexenone oxime ethers or phenoxypropionic esters;

B2 acetolactate synthase inhibitors (ALS): imidazolinones, pyrimidyl ethers, sulfonamides or sulfonylureas;

B4 auxin herbicides: pyridinecarboxylic acids or 2,4-D;

B5 auxin transport inhibitors;

B6 carotenoid biosynthesis inhibitors;

B7 enolpyruvylshikimate 3-phosphate synthase inhibitors;

B8 glutamine synthetase inhibitors;

B9 lipid biosynthesis inhibitors: chloroacetanilides or thioureas,

B10 mitosis inhibitors: dinitroanilines;

B11 protoporphyrinogen IX oxidase inhibitors: diphenyl ethers, oxadiazoles, cyclic imides or pyrazoles;

B12 photosynthesis inhibitors: pyridate, pyridafol, benzothiadiazinone, dipyridylene, ureas, phenols, chloridazon, triazines or triazinones, in particular pyridate, benzothinediazinone, dipyridylenes, ureas, phenols, chloridazon, triazines or triazinones;

B14 growth substances: aryloxyalkanoic acids, benzoic acids or quinolinecarboxylic acids.

In particular, the synergistic herbicidal mixture according to the invention comprises, as component B), at least one herbicidal compound from the group:

cycloxydim, sethoxydim, clodinafop (and, if appropriate, cloquintocet), fenoxaprop-ethyl, fenoxaprop-P-ethyl, imazapyr, imazaquin, imazamethabenz, imazethapyr, pyrithiobac-sodium, metosulam, halosulfuron-methyl, nicosulfuron, N-[[[4-methoxy-6-(trifluoromethyl)-1,3,5-triazin-2-yl]amino]carbonyl]-2-(trifluoromethyl)-benzenesulfonamide, flufenacet, 2,4-D, diflufenzopyr, isoxaflutole, sulcotrione, glyphosate, glufosinate-ammonium, dimethenamid, S-metolachlor, benthiocarb, pendimethalin, acifluorfen, carfentrazone-ethyl, cinidon-ethyl, pyridate, bentazon, paraquat-dichloride, diuron, isoproturon, bromoxynil, chloridazon, atrazine, metribuzin, MCPA, dicamba and quinclorac.

- Also preferably, the synergistic herbicidal mixture according to the invention comprises, as component B), at least one herbicidal compound from amongst the groups B1, B2, B4 to B11 and B14;

In particular, the synergistic herbicidal mixture according to the invention comprises at least one herbicidal compound from amongst the following groups:

B1 acetyl-CoA carboxylase inhibitors (ACC): cyclohexenone oxime ethers or phenoxypropionic esters;

B2 acetolactate synthase inhibitors (ALS): imidazolinones, pyrimidyl ethers, sulfonamides or sulfonylureas;

B4 auxin herbicides: 2,4-D;

B5 auxin transport inhibitors;

B6 carotenoid biosynthesis inhibitors;

B7 enolpyruvylshikimate 3-phosphate synthase inhibitors;

B8 glutamine synthetase inhibitors;

B9 lipid biosynthesis inhibitors: chloroacetanilides or thioureas,

B10 mitosis inhibitors:
dinitroanilines;

B11 protoporphyrinogen IX oxidase inhibitors:
diphenyl ethers, oxadiazoles, cyclic imides or pyrazoles;

B14 growth substances:
aryloxyalkanoic acid, benzoic acids or quinolinecarboxylic acids.

The synergistic herbicidal mixture particularly preferably comprises at least one herbicidal compound from amongst the group:

cycloxydim, sethoxydim, clodinafop (and, if appropriate, cloquintocet), fenoxaprop-ethyl, fenoxaprop-P-ethyl, imazapyr, imazaquin, imazamethabenz, imazethapyr, pyrithiobac-sodium, metosulam, halosulfuron-methyl, nicosulfuron, N-[[[4-methoxy-6-(trifluoromethyl)-1,3,5-triazin-2-yl]amino]carbonyl]-2-(trifluoromethyl)-benzenesulfonamide, flufenacet, 2,4-D, diflufenzopyr, isoxaflutole, sulcotrione, glyphosate, glufosinate-ammonium, dimethenamid, S-metolachlor, benthiocarb, pendimethalin, acifluorfen, carfentrazone-ethyl, cinidon-ethyl, MCPA, dicamba and quinclorac.

- Also preferably, the synergistic herbicidal mixture according to the invention comprises, as component B), at least one herbicidal compound from amongst the group B12.

The synergistic herbicidal mixture according to the invention comprises in particular at least one herbicidal compound from amongst the group:
propanil, pyridate, benzothiadiazinones, dinitrophenols, dipyridylenes, ureas, phenols, chloridazon, triazines, triazinones, uracils and biscarbamates.

Particularly preferably, the synergistic herbicidal mixture according to the invention comprises at least one herbicidal compound from amongst the group:
pyridate, bentazone, paraquat-dichloride, diuron, isoproturon, bromoxynil, chloridazon, atrazine or metribuzin.

Also particularly preferably, the herbicidal mixture according to the invention comprises at least one herbicidal compound from amongst the group: propanil, pyridate, dinitrophenols, dipyridylenes, chloridazon, triazinones, uracils and biscarbamates.

Particularly preferably, the synergistic herbicidal mixture according to the invention comprises at least one compound from amongst the group: pyridate, paraquat-dichloride, chloridazon or metribuzin.

- In a further particular embodiment, the synergistic herbicidal mixture according to the invention comprises, as component A), a 3-heterocyclyl-substituted benzoyl derivative of the formula I where

  R^2 is a heterocyclic radical selected from the group consisting of thiazol-2-yl, thiazol-4-yl and thiazol-5-yl, where the three abovementioned radicals may be unsubstituted or mono- or polysubstituted by halogen, C_1-C_4-alkyl, C_1-C_4-alkoxy, C_1-C_4-haloalkyl, C_1-C_4-haloalkoxy or C_1-C_4-alkylthio;

and, as component B), at least one herbicidal compound from amongst the groups B1, B2, B4 to B12 or B14;

- The synergistic herbicidal mixture according to the invention preferably comprises, as component B), at least one herbicidal compound from the following groups:

  B1 acetyl-CoA carboxylase inhibitors (ACC): cyclohexenone oxime ethers or phenoxypropionic esters;

  B2 acetolactate synthase inhibitors (ALS): imidazolinones, pyrimidyl ethers, sulfonamides or sulfonylureas;

  B4 auxin herbicides: pyridinecarboxylic acids or 2,4-D;

  B5 auxin transport inhibitors;

  B6 carotenoid biosynthesis inhibitors;

B7 enolpyruvylshikimate 3-phosphate synthase inhibitors;

B8 glutamine synthetase inhibitors;

B9 lipid biosynthesis inhibitors: chloroacetanilides or thioureas,

B10 mitosis inhibitors: dinitroanilines;

B11 protoporphyrinogen IX oxidase inhibitors: diphenyl ethers, oxadiazoles, cyclic imides or pyrazoles;

B12 photosynthesis inhibitors: pyridate, pyridafol, benzothiadiazinones, dipyridylenes, ureas, phenols, chloridazon, triazines or triazinones, in particular pyridate, benzothiadiazinones, dipyridylenes, ureas, phenols, chloridazon, triazines or triazinones;

B14 growth substances: aryloxyalkanoic acids, benzoic acids or quinolinecarboxylic acids.

In particular, the synergistic herbicidal mixture according to the invention comprises, as component B), at least one herbicidal compound from the group:

cycloxydim, sethoxydim, clodinafop (and, if appropriate, cloquintocet), fenoxaprop-ethyl, fenoxaprop-P-ethyl, imazapyr, imazaquin, imazamethabenz, imazethapyr, pyrithiobac-sodium, metosulam, halosulfuron-methyl, nicosulfuron, N-[[[4-methoxy-6-(trifluoromethyl)-1,3,5-triazin-2-yl]amino]carbonyl]-2-(trifluoromethyl)-benzenesulfonamide, flufenacet, 2,4-D, diflufenzopyr, isoxaflutole, sulcotrione, glyphosate, glufosinate-ammonium, dimethenamid, S-metolachlor, benthiocarb, pendimethalin, acifluorfen, carfentrazone-ethyl, cinidon-ethyl, pyridate, bentazon, paraquat-dichloride, diuron, isoproturon, bromoxynil, chloridazon, atrazine, metribuzin, MCPA, dicamba and quinclorac.

- Also preferably, the synergistic herbicidal mixture according to the invention comprises, as component B), at least one herbicidal compound from amongst the groups B1, B2, B4 to B11 and B14;

In particular, the synergistic herbicidal mixture according to the invention comprises at least one herbicidal compound from amongst the following groups:

B1 acetyl-CoA carboxylase inhibitors (ACC): cyclohexenone oxime ethers or phenoxypropionic esters;

B2 acetolactate synthase inhibitors (ALS): imidazolinones, pyrimidyl ethers, sulfonamides or sulfonylureas;

B4 auxin herbicides: 2,4-D;

B5 auxin transport inhibitors;

B6 carotenoid biosynthesis inhibitors;

B7 enolpyruvylshikimate 3-phosphate synthase inhibitors;

B8 glutamine synthetase inhibitors;

B9 lipid biosynthesis inhibitors: chloroacetanilides or thioureas,

B10 mitosis inhibitors: dinitroanilines;

B11 protoporphyrinogen IX oxidase inhibitors: diphenyl ethers, oxadiazoles, cyclic imides or pyrazoles;

B14 growth substances: aryloxyalkanoic acid, benzoic acids or quinolinecarboxylic acids.

The synergistic herbicidal mixture particularly preferably comprises at least one herbicidal compound from amongst the group:

cycloxydim, sethoxydim, clodinafop (and, if appropriate, cloquintocet), fenoxaprop-ethyl, fenoxaprop-P-ethyl, imazapyr, imazaquin, imazamethabenz, imazethapyr, pyrithiobac-sodium, metosulam, halosulfuron-methyl, nicosulfuron, N-[[[4-methoxy-6-(trifluoromethyl)-1,3,5-triazin-2-yl]amino]carbonyl]-2-(trifluoromethyl)-benzenesulfonamide, flufenacet, 2,4-D, diflufenzopyr, isoxaflutole, sulcotrione, glyphosate, glufosinate-ammonium, dimethenamid, S-metolachlor, benthiocarb, pendimethalin, acifluorfen, carfentrazone-ethyl, cinidon-ethyl, MCPA, dicamba and quinclorac.

- Also preferably, the synergistic herbicidal mixture according to the invention comprises, as component B), at least one herbicidal compound from amongst the group B12.

  The synergistic herbicidal mixture according to the invention comprises in particular at least one herbicidal compound from amongst the group:
  propanil, pyridate, benzothiadiazinone, dinitrophenols, dipyridylenes, ureas, phenols, chloridazone, triazines, triazinones, uracils and biscarbamates.

  Particularly preferably, the synergistic herbicidal mixture according to the invention comprises at least one herbicidal compound from amongst the group:
  pyridate, bentazone, paraquat-dichloride, diuron, isoproturon, bromoxynil, chloridazon, atrazine or metribuzin.

  Also particularly preferably, the herbicidal mixture according to the invention comprises at least one herbicidal compound from amongst the group:
  propanil, pyridate, dinitrophenols, dipyridylenes, chloridazon, triazinones, uracils and biscarbamates.

  Particularly preferably, the synergistic herbicidal mixture according to the invention comprises at least one compound from amongst the group:
  pyridate, paraquat-dichloride, chloridazon or metribuzin.

- In a further particular embodiment, the synergistic herbicidal mixture according to the invention comprises, as component A), a 3-heterocyclyl-substituted benzoyl derivative of the formula I where

R^2 is a heterocyclic radical selected from the group consisting of isoxazol-3-yl, isoxazol-4-yl and isoxazol-5-yl, where the three abovementioned radicals may be unsubstituted or mono- or polysubstituted by halogen, C_1-C_4-alkyl, C_1-C_4-alkoxy, C_1-C_4-haloalkyl, C_1-C_4-haloalkoxy or C_1-C_4-alkylthio;

and, as component B), at least one herbicidal compound from amongst the groups B1, B2, B4 to B12 or B14;

- The synergistic herbicidal mixture according to the invention preferably comprises, as component B), at least one herbicidal compound from the groups B1, B2, B4 to B11 and B14;

  In particular, the synergistic herbicidal mixture according to the invention comprises at least one herbicidal compound from the following groups:

  B1 acetyl-CoA carboxylase inhibitors (ACC): cyclohexenone oxime ethers or phenoxypropionic esters;

  B2 acetolactate synthase inhibitors (ALS): imidazolinones, pyrimidyl ethers, sulfonamides or sulfonylureas;

  B4 auxin herbicides: pyridinecarboxylic acids or 2,4-D;

  B5 auxin transport inhibitors;

  B6 carotenoid biosynthesis inhibitors;

  B7 enolpyruvylshikimate 3-phosphate synthase inhibitors;

  B8 glutamine synthetase inhibitors;

  B9 lipid biosynthesis inhibitors: chloroacetanilides or thioureas,

  B10 mitosis inhibitors: dinitroanilines;

  B11 protoporphyrinogen IX oxidase inhibitors:

diphenyl ethers, oxadiazoles, cyclic imides or pyrazoles;

B14 growth substances:
aryloxyalkanoic acid, benzoic acids or quinolinecarboxylic acids.

Particularly preferably, the synergistic herbicidal mixture comprises at least one herbicidal compound from amongst the group:

cycloxydim, sethoxydim, clodinafop (and, if appropriate, cloquintocet), fenoxaprop-ethyl, fenoxaprop-P-ethyl, imazapyr, imazaquin, imazamethabenz, imazethapyr, pyrithiobac-sodium, metosulam, halosulfuron-methyl, nicosulfuron, N-[[[4-methoxy-6-(trifluoromethyl)-1,3,5-triazin-2-yl]amino]carbonyl]-2-(trifluoromethyl)-benzenesulfonamide, flufenacet, 2,4-D, diflufenzopyr, isoxaflutole, sulcotrione, glyphosate, glufosinate-ammonium, dimethenamid, S-metolachlor, benthiocarb, pendimethalin, acifluorfen, carfentrazone-ethyl, cinidon-ethyl, MCPA, dicamba and quinclorac.

Also preferably, the herbicidal mixture according to the invention comprises at least one herbicidal compound from amongst the group:
propanil, pyridate, dinitrophenols, dipyridylenes, chloridazon, triazinones, uracils and biscarbamates.

In particular, the synergistic herbicidal mixture according to the invention comprises at least one compound from amongst the group:
pyridate, paraquat-dichloride, chloridazon or metribuzin.

- In a further particular embodiment, the synergistic herbicidal mixture comprises, as component A, a 3-heterocyclyl-substituted benzoyl derivative of the formula I and, as component B, a herbicidal compound. For particularly preferred embodiments, the preferences described above apply analogously.

- In a further particular embodiment, the synergistic herbicidal mixture comprises, as component A, a 3-heterocyclyl-substituted benzoyl derivative of the formula I and, as component B, two herbicidal compounds.

For particularly preferred embodiments, the preferences described above apply analogously.

In a further particularly preferred embodiment, the synergistic herbicidal mixture comprises, as component B, a herbicidal compound, where with respect to the preferred embodiments the above preferences apply, and a herbicidal compound from amongst the groups B12 and B14.

The present invention also extends to herbicidal compositions which comprise a herbicidally active amount of a synergistic herbicidal mixture (comprising components A) and B) as described above), at least one liquid and/or solid carrier and, if desired, at least one surfactant.

The herbicidal compositions and synergistic herbicidal mixtures according to the invention can effect very good control of broad-leaved weeds and grass weeds in crops such as maize, cereals, rice and soya without damaging the crop plants, an effect observed especially even at low rates of application.

Taking into consideration the variety of application methods in question, the herbicidal compositions and synergistic herbicidal mixtures according to the invention can additionally be employed in a further number of crop plants for eliminating undesirable plants. Examples of suitable crops are the following: Allium cepa, Ananas comosus, Arachis hypogaea, Asparagus officinalis, Beta vulgaris spp. [sic] altissima, Beta vulgaris spp. [sic] rapa, Brassica napus var. napus, Brassica napus var. napobrassica, Brassica rapa var. silvestris, Camellia sinensis, Carthamus tinctorius, Carya illinoinensis, Citrus limon, Citrus sinensis, Coffea arabica (Coffea canephora, Coffea liberica), Cucumis sativus, Cynodon dactylon, Daucus carota, Elaeis guineensis, Fragaria vesca, Glycine max, Gossypium hirsutum, (Gossypium arboreum, Gossypium herbaceum, Gossypium vitifolium), Helianthus annuus, Hevea brasiliensis, Hordeum vulgare, Humulus lupulus, Ipomoea batatas, Juglans regia, Lens culinaris, Linum usitatissimum, Lycopersicon lycopersicum, Malus spp., Manihot esculenta, Medicago sativa, Musa spp., Nicotiana tabacum (N.rustica), Olea europaea, Oryza sativa, Phaseolus lunatus, Phaseolus vulgaris, Picea abies, Pinus spp., Pisum sativum, Prunus avium, Prunus persica, Pyrus communis, Ribes sylvestre, Ricinus communis, Saccharum officinarum, Secale cereale, Solanum tuberosum, Sorghum bicolor (s. vulgare), Theobroma cacao, Trifolium pratense, Triticum aestivum, Triticum durum, Vicia faba, Vitis vinifera und Zea mays.

Moreover, the herbicidal compositions and synergistic herbicidal mixtures according to the invention can also be used in crops which tolerate the action of herbicides due to breeding, including genetic engineering methods.

The mixtures according to the invention, or the herbicidal compositions comprising them, can be employed, for example, in the form of directly sprayable aqueous solutions, powders, suspensions, also highly-concentrated aqueous, oily or other suspensions or dispersions, emulsions, oil dispersions, pastes, dusts, materials for spreading or granules, by means of spraying, atomizing, dusting, spreading or pouring.

The use forms depend on the intended purposes; in any case, they should guarantee the finest possible distribution of the active ingredients according to the invention.

Suitable inert auxiliaries are mineral oil fractions of medium to high boiling point such as kerosene and diesel oil, furthermore coal tar oils and oils of vegetable or animal origin, aliphatic, cyclic and aromatic hydrocarbons, e.g. paraffins, tetrahydronaphthalene, alkylated naphthalenes and their derivatives, alkylated benzenes and their derivatives, alcohols such as methanol, ethanol, propanol, butanol and cyclohexanol, ketones such as cyclohexanone, strongly polar solvents, such as N-methylpyrrolidone and water.

Aqueous use forms can be prepared from emulsion concentrates, suspensions, pastes, wettable powders or water-dispersible granules by adding water. To prepare emulsions, pastes or oil dispersions, the substrates [sic], as such or dissolved in an oil or solvent, can be homogenized in water by means of wetting agent, tackifier, dispersant or emulsifier. However, it is also possible to prepare concentrates composed of active substance, wetting agent, tackifier, dispersant or emulsifier and, if appropriate, solvent or oil, and these concentrates are suitable for dilution with water.

Suitable surfactants are the alkali metal, alkaline earth metal and ammonium salts of aromatic sulfonic acids, e.g. ligno-, phenol-, naphthalene- and dibutylnaphthalenesulfonic acid, and of fatty acids, of alkyl- and alkylaryl sulfonates, of alkyl sulfates, lauryl ether sulfates and fatty alcohol sulfates, and salts of sulfated hexa-, hepta- and octadecanols, and of fatty alcohol glycol ether, condensates of sulfonated naphthalene and its derivatives with formaldehyde, condensates of naphthalene, or of the naphthalenesulfonic acids, with phenol and formaldehyde,

polyoxyethylene octylphenyl ether, ethoxylated isooctyl-, octyl- or nonylphenol, alkylphenyl and tributylphenyl polyglycol ether, alkylaryl polyether alcohols, isotridecyl alcohol, fatty alcohol/ethylene oxide condensates, ethoxylated castor oil, polyoxyethylene alkyl ethers or polyoxypropylene alkyl ethers, lauryl alcohol polyglycol ether acetate, sorbitol esters, lignin-sulfite waste liquors or methylcellulose.

Powders, materials for spreading and dusts can be prepared by mixing or concomitantly grinding the synergistic herbicidal mixture or the individual active ingredients with a solid carrier.

Granules, e.g. coated granules, impregnated granules and homogeneous granules, can be prepared by binding the active ingredients to solid carriers. Solid carriers are mineral earths such as silicas, silica gels, silicates, talc, kaolin, limestone, lime, chalk, bole, loess, clay, dolomite, diatomaceous earth, calcium sulfate, magnesium sulfate, magnesium oxide, ground synthetic material, fertilizers such as ammonium sulfate, ammonium phosphate, ammonium nitrate, ureas and products of vegetable origin such as cereal meal, tree bark meal, wood meal and nutshell meal, cellulose powders or other solid carriers.

The concentrations of the mixtures according to the invention in the ready-to-use products can be varied within wide ranges. In general, the formulations comprise from 0.01 to 95% by weight, preferably 0.5 to 90% by weight, of the mixture according to the invention.

The active ingredients of components A) and B) can be formulated jointly, but also separately, and/or applied to the plants, their environment and/or seeds jointly or separately. It is preferable to apply the active ingredients simultaneously. However, it is also possible to apply them separately.

Moreover, it may be advantageous to apply the herbicidal compositions and synergistic herbicidal mixtures according to the invention, jointly or separately, with additional other crop protection agents, for example with pesticides or agents for controlling phytopathogenic fungi or bacteria. Also of interest is the miscibility with mineral salt solutions which are employed for treating nutritional and trace element deficiencies. Non-phytotoxic oils and oil concentrates can also be added.

The mixtures according to the invention and the herbicidal compositions can be applied pre- or post-emergence. If the active ingredients are less well tolerated by certain crop plants, application techniques may be used in which the herbicidal compositions are sprayed, with the aid of the spray apparatus, in such a way that they come into as little contact, if any, with the leaves of the sensitive crop plants while reaching the leaves of undesirable plants which grow underneath, or the bare soil (post-directed, lay-by).

In the case of a post-emergence treatment of the plants, the herbicidal compositions according to the invention are preferably applied by foliar application. Application may be effected, for example, by usual spraying techniques with water as the carrier, using amounts of spray mixture of approx. 100 to 1000 l/ha. The compositions may also be applied by the so-called "low-volume" and "ultra-low-volume" methods, or in the form of so-called granules.

As a rule, the synergistic herbicidal mixtures comprise components A) and B) in such weight ratios that the synergistic effect takes place. The ratios of component A) and B) in the mixture preferably range from 1:0.002 to 1:800, preferably from 1:0.003 to 1:160, particularly preferably from 1:0.02 to 1:160.

- In particular, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I and a herbicidal compound from the Group B1 (acetyl-CoA carboxylase inhibitors (ACC)) in a weight ratio of 1:0.1 to 1:80, preferably of 1:0.17 to 1:16.

- The mixtures according to the invention especially preferably comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I and a herbicidal compound from the group of the cyclohexenone oxime ethers, preferably cycloxydim, sethoxydim or tralkoxydim, in particular sethoxydim or tralkoxydim, in a weight ratio of 1:0.4 to 1:80, preferably 1:0.67 to 1:16.

- Also, the mixtures according to the invention especially preferably comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I and a herbicidal compound from the group of the phenoxyphenoxypropionic esters in a weight ratio of 1:0.1 to 1:60, preferably from 1:0.17 to 1:12.

Very particularly preferably, they comprise, as component B), clodinafop-propargyl in a weight ratio of 1:0.1 to 1:20, preferably 1:0.17 to 1:4.

Also very particularly preferably, they comprise, as component B), fenoxaprop-ethyl in a weight ratio of 1:0.2 to 1:60, preferably 1:0.34 to 1:12.

Also very particularly preferably, they comprise, as component B), fenoxaprop-P-ethyl in a weight ratio of 1:0.1 to 1:30, preferably 1:0.16 to 1:6.

- Also in particular, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I and a herbicidal compound from the Group B2 (acetolactate synthase inhibitors) in a weight ratio of 1:0.004 to 1:160, preferably 1:0.006 to 1:32.

  - Especially preferably, the mixtures according to the invention comprise 3-heterocyclyl-substituted benzoyl derivative of the formula I and a herbicidal compound from the group of the imidazolinones in a weight ratio of 1:0.08 to 1:160, preferably 1:0.13 to 1:32.

  Very particularly preferably, they comprise, as component B), imazapyr in a weight ratio of 1:0.12 to 1:80, ~~preferably 1:0.2 to 1:16~~.

  Also very particularly preferably, they comprise, as component B), imazaquin in a weight ratio of 1:0.2 to 1:60, preferably 1:0.33 to 1:12.

  Also very particularly preferably, they comprise, as component B), ~~imazamethabenz~~ in a weight ratio of 1:0.4 to 1:160, preferably 1:0.66 to 1:32.

  Also very particularly preferably, they comprise, as component B), ~~imazethapyr~~ in a weight ratio of 1:0.12 to 1:30, preferably 1:0.2 to 1:6.

  - Also especially preferably, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I and a herbicidal compound from the group of the pyrimidyl ethers, in particular pyrithiobac-sodium, in a weight ratio of 1:0.008 to 1:24, preferably 1:0.013 to 1:4.8.

- Also especially preferably, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I and a herbicidal compound from amongst the group of the sulfonamides in a weight ratio of 1:0.004 to 1:45, preferably 1:0.006 to 1:9.

  Very particularly preferably, they comprise, as component B), flumetsulam in a weight ratio of 1:0.1 to 1:45, preferably 1:0.17 to 1:9.

  Also very particularly preferably, they comprise, as component B), metosulam in a weight ratio of 1:0.004 to 1:12, preferably 1:0.006 to 1:2.4.

- Also especially preferably, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I and a herbicidal compound from the group of the sulfonylureas in a weight ratio of 1:0.004 to 1:24, preferably 1:0.006 to 1:4.8.

  Very particularly preferably, they comprise, as component B), halosulfuron-methyl, rimsulfuron or N-[[[4-methoxy-6-(trifluoromethyl)-1,3,5-triazin-2-yl]amino]carbonyl]-2-(trifluoromethyl)benzenesulfonamide in a weight ratio of 1:0.02 to 1:24, preferably 1:0.03 to 1:4.8.

  Also very particularly preferably, they comprise, as component B), nicosulfuron in a weight ratio of 1:0.02 to 1:24, preferably 1:0.03 to 1:4.8.

  Also very particularly preferably, they comprise, as component B), primisulfuron-methyl or prosulfuron in a weight ratio of 1:0.04 to 1:24, preferably 1:0.06 to 1:4.8.

  Also very particularly preferably, they comprise, as component B), thifensulfuron-methyl, tribenuron-methyl or sulfosulfuron in a weight ratio of 1:0.04 to 1:12, preferably 1:0.06 to 1:2.4.

- Also in particular, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I and a herbicidal compound from the Group B3 (amides), in particular fluthiamide, in a weight ratio of 1:1 to 1:400, preferably 1:0.6 to 1:80.

- Also in particular, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I and a herbicidal compound from the Group B4 (auxin-herbicides) in a weight ratio of 1:0.1 to 1:150, preferably 1:0.67 to 1:30.

  - Especially preferably, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I and a herbicidal compound from amongst the group of the pyridinecarboxylic acids, in particular clopyralid, in a weight ratio of 1:0.1 to 1:150, preferably 1:0.67 to 1:30.

  - Also especially preferably, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I and 2,4-D in a weight ratio of 1:0.2 to 1:150, preferably 1:0.33 to 1:30.

- Also in particular, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I and a herbicidal compound from the Group B5 (auxin transport inhibitors), preferably diflufenzopyr, in a weight ratio of 1:0.06 to 1:20, preferably 1:0.1 to 1:4.

- Also in particular, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I and a herbicidal compound from the Group B6 (carotenoid biosynthesis inhibitors) in a weight ratio of 1:0.1 to 1:120, preferably 1:0.17 to 1:24.

  - Especially preferably, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I and isoxaflutole or isoxachlortole in a weight ratio of 1:0.1 to 1:40, preferably 1:0.17 to 1:8.

  - Also especially preferred, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I and mesotrione or ketospiradox in a weight ratio of 1:0.1 to 1:60, preferably 1:0.16 to 1:12.

  - Also especially preferred, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I and sulcotrione in a weight ratio of 1:0.4 to 1:120, preferably 1:0.66 to 1:24.

- Also in particular, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I and a herbicidal compound from the Group B7 (enolpyruvylshikimate-3-phosphate synthase inhibitors (ESPS)), preferably glyphosate or sulfosate, in a weight ratio of 1:1.4 to 1:216, preferably 1:2.4 to 1:43.2.

- Also in particular, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I and a herbicidal compound from the group B8 (glutamine synthetase inhibitors), preferably glufosinate-ammonium, in a weight ratio of 1:0.04 to 1:120, preferably 1:0.06 to 1:24.

- Also in particular, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I and a herbicidal compound from the group B9 (lipid biosynthesis inhibitors) in a weight ratio of 1:0.24 to 1:800, preferably 1:0.40 to 1:160.

  - Especially preferably, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I and a herbicidal compound from the group of the chloroacetanilides in a weight ratio of 1:0.24 to 1:800, preferably 1:0.4 to 1:160.

  - Very particularly preferably, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I and dimethenamid or S-dimethenamid in a weight ratio of 1:0.24 to 1:400, preferably 1:0,4 to 1:80.

  - Also very particularly preferably, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I and acetochlor in a weight ratio of 1:1 to 1:800, preferably 1:1.67 to 1:160.

  - Also very particularly preferably, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I and metolachlor or S-metolachlor in a weight ratio of 1:0.24 to 1:800, preferably 1:0.40 to 1:160.

  - Especially preferably, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I and a herbicidal compound

from the group of the thioureas in a weight ratio of 1:0.4 to 1:800, preferably 1:0.66 to 1:160.

Very particularly preferably, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I and benthiocarb in a weight ratio of 1:4 to 1:800, preferably 1:6.6 to 1:160.

- Also in particular, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I and a herbicidal compound from the group B10 (mitosis inhibitors), preferably a dinitroaniline, in particular pendimethalin, in a weight ratio of 1:1,5 to 1:600, preferably 1:2,5 to 1:120.

- Also in particular, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I and a herbicidal compound from the group B11 (protoporphyrinogen IX oxidase inhibitors) in a weight ratio of 1:0.002 to 1:120, preferably 1:0.003 to 1:24.

  - Especially preferably, the mixtures according to the invention comprise 3-heterocyclyl-substituted benzoyl derivative of the formula I and a herbicidal compound from the group of the diphenylethers, in particular acifluorfen or acifluorfen-sodium, in a weight ratio of 1:0.2 to 1:60, preferably 1:0.33 to 1:12.

  - Also especially preferably, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I and a herbicidal compound from the group of the oxadiazoles, in particular oxadiargyl, in a weight ratio of 1:0.2 to 1:120, preferably 1:0.33 to 1:24.

  - Also especially preferably, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I and a herbicidal compound from the group of the cyclic imides in a weight ratio of 1:0.002 to 1:60, preferably 1:0.003 to 1:12.

Very particularly preferably, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I and carfentrazone-ethyl in a weight ratio of 1:0.002 to 1:7, preferably 1:0.003 to 1:1.4.

- Also very particularly preferably, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I cinidon-ethyl or flumiclorac-pentyl, in a weight ratio of 1:0.012 to 1:7, preferably 1:0.02 to 1:1.4.

  Also very particularly preferably, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I and butafenacil in a weight ratio of 1:0.02 to 1:60, preferably 1:0.03 to 1:12.

  Also very particularly preferably, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I and JV 485 in a weight ratio of 1:0.2 to 1:60, preferably 1:0.3 to 1:12.

- In particular, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I and a herbicidal compound from group B12 (photosynthesis inhibitors) in a weight ratio of 1:0.12 to 1:800, preferably 1:0.2 to 1:160.

  - Especially preferably, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I and pyridate or pyridafol in a weight ratio of 1:1 to 1:300, preferably 1:1.67 to 1:60.

  - Also especially preferably, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I and a herbicidal compound from the group of the benzothiadiazinones, in particular bentazone, in a weight ratio of 1:1.92 to 1:288, preferably 1:3.2 to 1:57.6.

  - Also especially preferably, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I and a herbicidal compound from the group of the dipyridylenes, in particular paraquat-dichloride, in a weight ratio of 1:0.4 to 1:160, preferably 1:0.66 to 1:32.

  - Also especially preferably, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I and a herbicidal compound from the group of the ureas, in particular diuron or

isoproturon, in a weight ratio of 1:1 to 1:320, preferably 1:1.67 to 1:64.

- Also especially preferably, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I and a herbicidal compound from the group of the phenols, in particular bromoxynil, in a weight ratio of 1:0.4 to 1:140, preferably 1:0.67 to 1:28.

- Also especially preferably, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I and chloridazon in a weight ratio of 1:2 to 1:800, preferably 1:3.3 to 1:160.

- Also especially preferably, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I and a herbicidal compound from the group of the triazines, in particular atrazine or terbutylazine, in a weight ratio of 1:1 to 1:800, preferably 1:1.67 to 1:160.

- Also especially preferably, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I and a herbicidal compound from the group of the triazinones, in particular metribuzin, in a weight ratio of 1:0.12 to 1:60, preferably 1:0.2 to 1:12.

- Also in particular, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I and a herbicidal compound from the group B13 (synergists), preferably an oxirane, in particular tridiphane, in a weight ratio of 1:2 to 1:300, preferably 1:3.33 to 1:60.

- Also in particular, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I and a herbicidal compound from the group B14 (growth substances) in a weight ratio of 1:0.1 to 1:240, preferably 1:0.167 to 1:48.

- Especially preferably, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I and a herbicidal compound

from the group of the aryloxyalkanoic acids in a weight ratio of 1:0.2 to 1:240, preferably 1:0,33 to 1:48.

Very particularly preferably, they comprise, as component B) fluoroxypyr in a weight ratio of 1:0.2 to 1:80, preferably 1:0.33 to 1:16.

Also very particularly preferably, they comprise, as component B), MCPA or mecoprop-P in a weight ratio of 1:1.6 to 1:240, preferably 1:2.67 to 1:48.

- Also especially preferably, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I and a herbicidal compound from the group of the benzoic acids, in particular dicamba, in a weight ratio of 1:0.3 to 1:160, preferably 1:0.5 to 1:32.

- Also especially preferably, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I and a herbicidal compound from the group of the quinolinecarboxylic acids, in particular quinclorac, in a weight ratio of 1:0,1 to 1:120, preferably 1:0.16 to 1:24.

- Also in particular, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I and a herbicidal compound from the group B16 (various other herbicides), in particular triaziflam, in a weight ratio of 1:0.2 to 1:150, preferably 1:0.3 to 1:30.

- Also in particular, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I and two herbicidal compounds from the groups B1 to B16, where the weight ratio of the 3-heterocyclyl-substituted benzoyl derivative of the formula I to each of the individual herbicidal components of B) is in the ranges described above.

- Especially preferably, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I, a herbicidal compound from the group B2 and a herbicidal compound from the group B14 in a weight ratio of 1:0.004:0.1 to 1:160:240, preferably 1:0.006:0.16 to 1:32:48.

- Especially preferably, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I, a herbicidal compound from the group B5 and a herbicidal compound from the group B14 in a weight ratio of 1:0.06:0.1 to 1:20:240, preferably 1:0.1:0.16 to 1:4:48.

- Also especially preferably, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I, a herbicidal compound from the group B9 and a herbicidal compound from the group B12 in a weight ratio of 1:0.24:0.12 to 1:80:800, preferably 1:0.48:0.2 to 1:16:160.

- Also especially preferably, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I, a herbicidal compound from the group B12 and a herbicidal compound likewise from the group B12 in a weight ratio of 1:0.12:0.12 to 1:800:800, preferably 1:0.2:0.2 to 1:160:160.

- Also especially preferably, the mixtures according to the invention comprise a 3-heterocyclyl-substituted benzoyl derivative of the formula I, a herbicidal compound from the group B12 and a herbicidal compound from the group B14 in a weight ratio of 1:0.12:0.1 to 1:800:240, preferably 1:0.2:0.16 to 1:160:48.

The rate of application of pure synergistic herbicidal mixture, i.e. without formulation auxiliaries, amounts to 2 to 5000 g/ha, preferably 2 to 4500 g/ha, in particular 8 to 4500 g/ha, of active substance (a.s.), depending on the intended aim, the season, the target plants and growth stage.

The rate of application of 3-heterocyclyl-substituted benzoyl derivative of the formula I is 0.1 to 250 g/ha, as a rule 5 to 250 g/ha, preferably 25 to 150 g/ha, of active substance (a.s.).

The preferred rate of application of the individual classes of active ingredients, or of the active ingredients of component B, are compiled in Table 2.

Table 2

Component B	Class of active ingredient	Active ingredient	Rate of application (g/ha)
B1 Acetyl-CoA carboxylase inhibitors			25-400
	cyclohexenone oxime ethers		100-400
		cycloxydim	100-400
		sethoxydim	100-400
		tralkoxydim	100-400
	phenoxyphenoxypropionic esters		25-300
		clodinafpop-P-propargyl[a]	25-100
		fenoxaprop-ethyl	50-300
		fenoxaprop-P-ethyl	25-150
B2 Acetolactate synthase inhibitors (ALS)			1-800
	imidazolinones		20-800
		imazapyr	30-400
		imazaquin	50-300
		imazamethabenz	100-800
		imazaethopyr	30-150
		imazamox	20-120
	pyrimidyl ethers		2-120
		pyrithiobac-sodium	2-120

Component B	Class of active ingredient	Active ingredient	Rate of application (g/ha)
	sulfonamides		1-225
		florasulam	1-20
		flumetsulam	25-225
		metosulam	1-60
	sulfonylureas		1-120
		halosulfuron-methyl	5-120
		nicosulfuron	1-120
		primisulfuron-methyl	10-120
		prosulfuron	10-120
		rimsulfuron	5-120
		thifensulfuron-methyl	10-60
		tribenuron-methyl	10-60
		N-[[[4-methoxy-6-(trifluoromethyl)-1,3,5-triazin-2-yl]amino]carbonyl]-2-(trifluoromethyl)benzenesulfonamide	5-120
		sulfosulfuron	10-60
B3 Amides			250-2000
	-	fluthiamide	250-2000
B4 Auxin herbicides			25-750

Component B		Class of active ingredient	Active ingredient	Rate of application (g/ha)
		pyridinecarboxylic acids		25-750
			clopyralid	25-750
		-	2,4-D	50-750
B5	Auxin transport inhibitors			15-100
		-	diflufenzopyr	15-100
B6	Carotenoid biosynthesis inhibitors			25-600
		-	isoxaflutole	25-200
		-	sulcotrione	100-600
		-	mesotrione	25-300
		-	isoxachlortole	25-200
		-	ketospiradox	25-300
B7	Enolpyruvylshikimat-3-phosphate synthase inhibitors (ESPS)			360-1080
		-	glyphosate	360-1080
		-	sulfosate	360-1080
B8	Glutamine synthetase inhibitors			10-600
		-	glufosinate-ammonium	10-600
B9	Lipid biosynthesis inhibitors			60-4000
		chloroacetanilides		60-4000

Component B		Class of active ingredient	Active ingredient	Rate of application (g/ha)
			dimethenamid	60-2000
			S-dimethenamid	60-2000
			acetochlor	250-4000
			metolachlor	60-4000
			S-metolachlor	60-4000
		thioureas		100-4000
			benthiocarb	1000-4000
B10	Mitosis inhibitors			375-3000
		dinitroanilines		375-3000
			pendimethalin	375-3000
B11	Protophorphyrinogen [sic] IX oxidase inhibitors			0.5-600
		diphenyl ethers		50-300
			acifluorfen	50-300
			acifluorfen-sodium	50-300
		oxadiazoles		50-600
			oxadiargyl	50-600
		cyclic imides		0.5-300
			carfentrazone-ethyl	0.5-35

Component B	Class of active ingredient	Active ingredient	Rate of application (g/ha)
		cinidon-ethyl	3-35
		flumiclorac-pentyl	3-35
		butafenacil	5-300
		JV 485	50-300
B12 Photosynthesis inhibitors			30-4000
	-	pyridate	250-1500
		pyridafol	250-1000
	benzothiadiazinones		480-1440
		bentazone	480-1440
	dipyridylenes		100-800
		paraquat-dichloride	100-800
	ureas		250-1600
		diuron	250-1600
		isoprotoron	250-1600
	phenols		100-700
		bromoxynil	100-700
	chloridazon		500-4000
	triazines		250-4000
		atrazine	250-4000

Component B	Class of active ingredient	Active ingredient	Rate of application (g/ha)
		terbutylazine	250-4000
	triazinone		30-300
		metribuzin	30-300
B13 Synergists			500-1500
	oxiranes		500-1500
		tridiphane	500-1500
B14 Growth substances			25-1200
	aryloxyalkanoic acids		50-1200
		fluoroxypyr	50-400
		MCPA	400-1200
		mecoprop-P	400-1200
	benzoic acids		75-800
		dicamba	75-800
	quinolinecarboxylic acids		25-600
		quinclorac	25-600
B16 Various other herbicides	-	triaziflam	50-750

[a] If appropriate, 10-50 g/ha cloquintocet may also be added.

Use examples

The mixtures according to the invention were applied pre- or post-emergence (foliar treatment). The herbicidal compounds of component B were applied in the formulation in which they are present as commercially available product.

Some of the experiments were greenhouse experiments and some were field trials on mini plots (on a site with sandy loam (pH 6.2 to 7.0) or sandy clay (pH 5.0 to 6.7) as the soil).

The harmful plants differed with regard to size and developmental state; on average, they were 5 to 20 cm long, depending on the growth habit.

The herbicidally active compounds of components A) and B) were applied in succession or jointly, in the latter case in some cases as a tank mix and in some cases as a readymix, in the form of emulsions, aqueous solutions or suspensions, the vehicle being water (300 - 400 l/ha). In the case of the field trials, application was effected with the aid of a mobile plot sprayer.

The test period extended over 3 to 8 weeks, and the stands were also observed at later points in time.

Damage by the herbicidal compositions was evaluated with reference to a scale of 0% to 100% in comparison with untreated control plots. 0 means no damage and 100 means complete destruction of the plants.

The following examples will demonstrate the action of the herbicidal compositions which can be used according to the invention, without excluding the possibility of other uses.

In these examples, the value E at which only an additive effect of the individual active ingredients is to be expected was calculated by the method of S. R. Colby (Calculating synergistic and antagonistic responses of herbicide combinations, Weeds 15, 20 pp (1967).

This was done using the formula

$$E = X + Y - \frac{XY}{100}$$

where

X = Percentage of the herbicidal action of component A) at an application rate of a;

Y = Percentage of the herbicidal action of component B) at an application rate of b;

E = expected herbicidal action of component A) + B) at rates of application a + b (in %).

If the value observed exceeds the value E calculated in accordance with Colby's formula, then synergism is present.

The herbicidal mixtures according to the invention exert a greater herbicidal action than would have been expected according to Colby on the basis of the observed effects of the individual components when used alone.

The results of the tests are shown in Tables 3 to 82 below.

In these studies, the following plants were used:

Scientific name	Common name
Abutilon theophrasti	Chinese lantern
Alopecuros myosuroides	Slender foxtail
Amaranthus retroflexus	Redroot pigweed
Anthemis mixta	Camomile
Bidens pilosa	Common blackjack
Brachiaria plantaginea	Alexander grass
Chenopodium album	Lambsquarters
Cyperus iria	-
Cyperus species	Cyprus grass species
Digitaria adscendens	Crab grass
Digitaria sanguinalis	Hairy fingergrass
Echinochloa crus-galli	Common barnyard grass
Galium aparine	Bedstraw, catchweed
Geranium carolinianum	Carolina geranium

Scientific name	Common name
Ipomoea acuminata	Blue morning-glory
Ipomoea lacunosa	-
Ipomoea purpurea var. diversifolia	-
Ipomoea ssp. [sic]	Morning-glory species
Lolium perenne	Perennial rye grass
Panicum miliaceum	Prozo millet
Phalaris spec.	Canary grass species
Richardia brasiliensis	-
Setaria faberi	Giant foxtail
Setaria viridis	Green foxtail
Sorghum bicolor	Common sorghum
Sorghum halepense	Johnson grass
Stellaria media	Common chickweed
Triticum aestivum	Winter wheat
Veronica ssp. [sic]	Speedwell species
Zea mays	Maize

Table 3: Herbicidal action of compound Ia.3 and "cycloxydim" (B1) on Chenopodium album in the field (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.3	Cycloxydim		
50	---	92	---
---	100	0	---
50	100	98	92

Table 4: Herbicidal action of compound Ia.3 and "cycloxydim" (B1) on Digitaria sanguinalis in the field (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.3	Cycloxydim		
50	---	57	---
---	100	81	---
50	100	98	92

Table 5: Herbicidal action of compound Ia.3 and "sethoxydim" (B1) on Abutilon theophrasti in the field (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby Value E
Ia.3	Sethoxydim		
50	---	85	---
---	160	0	---
50	160	94	85

Table 6: Herbicidal action of compound Ia.3 and "sethoxydim" (B1) on Setaria viridis in the field (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.3	Sethoxydim		
100	---	75	---
---	160	93	---
100	160	99	98

Table 7: Herbicidal action of compound Ia.3 and "clodinafop-propargyl + cloquintocet" (B1) on Alopecurus myosuroides in the field (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.3	clodinafop-propargyl + cloquintocet		
7.5	---	10	---
---	40	63	---
75	40	94	67

Table 8: Herbicidal action of compound Ia.3 and "fenoxaprop-ethyl" (B1) on Alopecurus myosuroides in the field (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.3	fenoxaprop-ethyl		
75	---	10	---
---	83	82	---
75	83	94	84

Table 9: Herbicidal action of compound Ia.3 and "fenoxaprop-ethyl" (B1) on Galium aparine in the field (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.3	fenoxaprop-ethyl		
75	---	63	---
---	83	0	---
75	83	75	63

Table 10: Herbicidal action of compound Ia.3 and "fenoxaprop-P-ethyl" (B1) on Amaranthus retroflexus in the greenhouse (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.3	fenoxaprop-ethyl		
15.6	---	80	---
---	31.2	0	---
15.6	31.2	95	80

Table 11: Herbicidal action of compound Ia.33 and "imazapyr" (B1) on Alopecurus myosuroides in the greenhouse (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.33	imazapyr		
15.6	---	40	---
---	250	90	---
15.6	250	95	94

Table 12: Herbicidal action of compound Ia.33 and "imazapyr" (B1) on Ipomoea ssp. [sic] in the greenhouse (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.33	imazapyr		
3.9	---	50	---
---	62.5	85	---
3.9	62.5	95	93

Table 13: Herbicidal action of compound Ia.3 and "imazaquin" (B2) on Bidens pilosa in the field (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.3	imazaquin		
75	---	30	---
---	150	45	---
75	150	95	62

Table 14: Herbicidal action of compound Ia.3 and "imazamethabenz" (B2) on Stellaria media in the field (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.3	imazamethabenz		
75	---	91	---
---	525	0	---
75	525	99	91

Table 15: Herbicidal action of compound Ia.3 and "imazethapyr" (B2) on Ipomoea acuminata in the field (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.3	imazethapyr		
75	---	25	---
---	70	33	---
75	70	95	50

Table 16: Herbicidal action of compound Ia.3 and "imazethapyr" (B2) on Ipomoea purpurea var. diversifolia in the field (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.3	imazethapyr		
75	---	93	---
---	70	58	---
75	70	99	97

Table 17: Herbicidal action of compound Ia.33 and "pyrithiobac-sodium" (B2) on Echinochloa crus-galli in the greenhouse (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.33	pyrithiobac-sodium		
1.9	---	55	---
---	7.8	10	---
1.9	7.8	75	59

Table 18: Herbicidal action of compound Ia.33 and "metosulam" (B2) on Veronica ssp. [sic] im the greenhouse (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.33	metosulam		
62.5	---	20	---
---	1.9	40	---
62.5	1.9	75	52

Table 19: Herbicidal action of compound Ia.33 and "halosulfuron-methyl" (B2) on Alopecurus myosuroides in the greenhouse (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.33	halosulfuron-methyl		
62.5	---	40	---
---	31.2	45	---
62.5	31.2	85	67

Table 20: Herbicidal action of compound Ia.33 and "halosulfuron-methyl" (B2) on Amaranthus retroflexus in the greenhouse (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.33	halosulfuron-methyl		
7.8	---	70	---
---	7.8	80	---
7.8	7.8	98	94

Table 21: Herbicidal action of compound Ia.33 and "nicosulfuron" (B2) on Ipomoea lacunosa in the field (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.33	nicosulfuron		
75	---	69	---
---	35	39	---
75	35	90	81

Table 22: Herbicidal action of compound Ia.50 and "nicosulfuron" (B2) on Amaranthus retroflexus in the greenhouse (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.50	nicosulfuron		
3.9	---	10	---
---	1.9	65	---
3.9	1.9	80	69

Table 23: Herbicidal action of compound Ia.33 and "N-[[[4-methoxy-6-(trifluoromethyl)-1,3,5-triazin-2-yl]amino]carbonyl]-2-(trifluoromethyl)benzenesulfonamide" (B2) on Setaria faberi in the field (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.33	N-[[[4-methoxy-6-(trifluoromethyl)-1,3,5-triazin-2-yl]-amino]carbonyl]-2-(trifluoromethyl)benzenesulfonamide		
75	---	65	---
---	50	0	---
75	50	73	65

Table 24: Herbicidal action of compound Ia.3 and "2,4-D" (B4) on Abutilon theophrasti in the greenhouse (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.3	2,4-D		
15.6	---	70	---
---	62.5	40	---
15.6	62.5	85	82

Table 25: Herbicidal action of compound Ia.3 and "2,4-D" (B4) on Amaranthus retroflexus in the greenhouse (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby Value E
Ia.3	2,4-D		
15.6	---	55	---
---	62.5	20	---
15.6	62.5	70	64

Table 26: Herbicidal action of compound Ia.3 and "2,4-D" (B4) on Phalaris spec. in the field (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.3	2,4-D		
75	---	20	---
---	500	20	---
75	500	43	36

Table 27: Herbicidal action of compound Ia.3 and "isoxaflutole" (B6) on ipomoea ssp. [sic] in the greenhouse (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.3	isoxaflutole		
31.2	---	75	---
---	62.5	55	---
31.2	62.5	90	89

Table 28: Herbicidal action of compound Ia.3 and "isoxaflutole" (B6) on Setaria viridis in the greenhouse (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.3	isoxaflutole		
15.6	---	80	---
---	31.2	30	---
15.6	31.2	90	86

Table 29: Herbicidal action of compound Ia.3 and "sulcotrione" (B6) on Ipomoea acuminata in the field (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.3	sulcotrione		
75	---	25	---
---	300	86	---
75	300	98	90

Table 30: Herbicidal action of compound Ia.50 and "sulcotrione" (B6) on Amaranthus retroflexus in the greenhouse (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.50	sulcotrione		
31.2	---	60	---
---	250	45	---
31.2	250	80	78

Table 31: Herbicidal action of compound Ia.3 and "glyphosate" (B7) on Geranium carolinianum in the field (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.3	glyphosate		
150	---	30	---
---	840	97	---
150	840	100	98

Table 32: Herbicidal action of compound Ia.33 and "glyphosate" (B7) on Sorghum halepense in the field (post-emergemce treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.33	glyphosate		
75	---	78	---
---	840	74	---
75	840	97	94

Table 33: Herbicidal action of compound Ia.3 and "glufosinate-ammonium" (B8) on Digitaria adscendens in the field (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.3	glufosinate-ammonium		
75	---	90	---
---	400	75	---
75	400	100	98

Table 34: Herbicidal action of compound Ia.33 and "glufosinate-ammonium" (B8) on Echinochloa crus-galli in the greenhouse (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.33	glufosinate-ammonium		
15.6	---	90	---
---	15.6	0	---
15.6	15.6	98	90

Table 35: Herbicidal action of compound Ia.3 and "glufosinate-ammonium" (B8) on Ipomoea acuminata in the field (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.3	glufosinate-ammonium		
75	---	25	---
---	400	75	---
75	400	98	81

Table 36: Herbicidal action of compound Ia.33 and "glufosinate-ammonium" (B8) on Setaria faberi in the greenhouse (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.33	glufosinate-ammonium		
7.8	---	90	---
---	31.2	65	---
7.8	31.2	98	96

Table 37: Herbicidal action of compound Ia.3 and "flufenacet" (B3) on Digitaria adscendens in the field (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.3	flufenacet		
75	---	90	---
---	600	58	---
75	600	100	96

Table 38: Herbicidal action of compound Ia.3 and "dimethenamid" (B9) on Amaranthus retroflexus in the greenhouse (pre-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby-value E
Ia.3	Dimethenamid		
31.2	---	40	---
---	125	80	---
31.2	125	100	88

Table 39: Herbicidal action of compound Ia.3 and "dimethenamid" (B9) on Cyperus iria in the greenhouse (pre-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby-value E
Ia.3	Dimethenamid		
31.2	---	50	---
---	62.5	95	---
31.2	62.5	100	98

Table 40: Herbicidal action of compound Ia.3 and "dimethenamid" (B9) on Digitaria sanguinalis in the greenhouse (pre-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.3	Dimethenamid		
62.5	---	60	---
---	125	80	---
62.5	125	98	92

Table 41: Herbicidal action of compound Ia.33 and "dimethenamid" (B9) on Panicum miliaceum in the field (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.33	dimethenamid		
50	---	87	---
---	841	23	---
50	841	94	90

Table 42: Herbicidal action of compound Ia.33 and "dimethenamid" (B9) on Sorghum halepense in the field (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.33	dimethenamid		
75	---	78	---
---	1120	7	---
75	1120	90	80

Table 43: Herbicidal action of compound Ia.33 and "dimethenamid" (B9) on Veronica ssp. [sic] in the greenhouse (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.33	Dimethenamid		
15.6	---	60	---
---	500	70	---
15.6	500	90	88

Table 44: Herbicidal action of compound Ia.52 and "dimethenamid" (B9) on Amaranthus retroflexus in the greenhouse (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.52	Dimethenamid		
62.5	---	75	---
---	500	10	---
62.5	500	100	78

Table 45: Herbicidal action of compound Ia.52 and "dimethenamid" (B9) on Veronica ssp. [sic] in the greenhouse (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.52	Dimethenamid		
15.6	---	40	---
---	500	70	---
15.6	500	100	82

Table 46: Herbicidal action of compound Ia.33 and "acetochlor" (B9) on Abutilon theophrasti in the greenhouse (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.33	acetochlor		
7.8	---	90	---
---	31.2	0	---
7.8	31.2	100	90

Table 47: Herbicidal action of compound Ia.3 and "S-metolachlor" (B9) on Digitaria sanguinalis in the greenhouse (pre-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.3	S-Metolachlor		
62.5	---	60	---
---	125	50	---
62.5	125	85	80

Table 48: Herbicidal action of compound Ia.3 and "S-metolachlor" (B9) on Echinochloa crus-galli in the greenhouse (pre-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.3	S-Metolachlor		
62.5	---	60	---
---	62.5	65	---
62.5	62.5	98	86

Table 49: Herbicidal action of compound Ia.3 and "S-metolachlor" (B9) on Setaria viridis in the greenhouse (pre-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.3	S-Metolachlor		
15.6	---	20	---
---	62.5	70	---
15.6	62.5	85	76

Table 50: Herbicidal action of compound Ia.33 and "S-metolachlor" (B9) on Ipomoea ssp. [sic] in the greenhouse (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.33	S-Metolachlor		
62.5	---	80	---
---	62.5	0	---
62.5	62.5	90	80

Table 51: Herbicidal action of compound Ia.33 and "S-metolachlor" (B9) on Veronica ssp. [sic] in the greenhouse (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.33	S-Metolachlor		
62.5	---	80	---
---	125	0	---
62.5	125	98	80

Table 52: Herbicidal action of compound Ia.16 and "benthiocarb" (B9) on Cyperus iria in the field (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.16	benthiocarb		
75	---	60	---
---	3000	50	---
75	3000	92	80

Table 53: Herbicidal action of compound Ia.3 and "pendimethalin" (B10) on Brachiaria plantaginea in the field (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.3	pendimethalin		
75	---	96	---
---	990	0	---
75	990	98	96

Table 54: Herbicidal action of compound Ia.3 and "acifluorfen" (B11) on Galium aparine in the field (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.3	acifluorfen		
75	---	60	---
---	100	48	---
75	100	95	79

Table 55: Herbicidal action of compound Ia.33 and "carfentrazone-ethyl" (B11) on Amaranthus retroflexus in the greenhouse (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.33	carfentrazone-ethyl		
1.9	---	30	---
---	0.9	60	---
1.9	0.9	90	72

Table 56: Herbicidal action of compound Ia.3 and "carfentrazone-ethyl" (B11) on Anthemis mixta in the field (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.3	carfentrazone-ethyl		
75	---	68	---
---	30	0	---
75	30	91	68

Table 57: Herbicidal action of compound Ia.33 and "cinidon-ethyl" (B11) on Galium aparine in the field (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.33	cinidon-ethyl		
1.9	---	20	---
---	7.8	90	---
1.9	7.8	100	92

Table 58: Herbicidal action of compound Ia.3 and "pyridate" (B12) on Bidens pilosa in the field (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.3	pyridate		
75	---	25	---
---	450	25	---
75	450	96	44

Table 59: Herbicidal action of Ia.3 and "pyridate" (B12) on Setaria faberi in the field (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.3	pyridate		
75	---	99	---
---	450	0	---
75	450	100	99

Table 60: Herbicidal action of compound Ia.3 and "bentazone" (B12) on Richardia brasiliensis in the field (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.3	Bentazone		
75	---	70	---
---	1440	77	---
75	1440	99	93

Table 61: Herbicidal action of compound Ia.3 and "paraquat-dichloride" (B12) on Lolium perenne in the field (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.3	paraquat-dichloride		
75	---	10	---
---	400	97	---
75	400	100	97

Table 62: Herbicidal action of compound Ia.33 and "diuron" (B12) on Alopecurus myosuroides in the greenhouse (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.33	diuron		
62.5	---	40	---
---	250	80	---
62.5	250	95	88

Table 63: Herbicidal action of compound Ia.3 and "isoproturon" (B12) on Stellaria media in the field (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.3	isoproturon		
75	---	91	---
---	1000	94	---
75	1000	100	99

Table 64: Herbicidal action of compound Ia.3 and "bromoxynil" (B12) on Galium aparine in the field (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.3	bromoxynil		
75	---	60	---
---	470	84	---
75	470	98	94

Table 65: Herbicidal action of compound Ia.3 and "chloridazon" (B12) on Ipomoea purpurea var. diversifolia in the field (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.3	chloridazon		
75	---	94	---
---	1720	40	---
75	1720	100	96

Table 66: Herbicidal action of compound Ia.3 and "atrazine" (B12) on Abutilon theophrasti in the field (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.3	atrazine		
75	---	85	---
---	1120	32	---
75	1120	96	90

Table 67: Herbicidal action of compound Ia.3 and "atrazine" (B12) on Setaria faberi in the field (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.3	atrazine		
75	---	95	---
---	1120	20	---
75	1120	99	96

Table 68: Herbicidal action of compound Ia.33 and "atrazine" (B12) on Sorghum bicolor in the field (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.33	atrazine		
75	---	78	---
---	840	27	---
75	840	90	84

Table 69: Herbicidal action of compound Ia.3 and "metribuzin" (B12) on Bidens pilosa in the field (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.3	metribuzin		
75	---	25	---
---	200	38	---
75	200	73	54

Table 70: Herbicidal action of compound Ia.3 and "metribuzin" (B12) on Cyperus species in the field (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.3	metribuzin		
75	---	5	---
---	200	50	---
75	200	75	53

Table 71: Herbicidal action of compound Ia.3 and "MCPA" (B14) on Cyperus species in the field (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.3	MCPA		
75	---	0	---
---	600	5	---
75	600	48	5

Table 72: Herbicidal action of compound Ia.16 and "dicamba" (B14) on Amaranthus retroflexus in the field (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.16	dicamba		
100	---	96	---
---	280	25	---
100	280	100	97

Table 73: Herbicidal action of compound Ia.33 and "dicamba" (B14) on Sorghum bicolor in the field (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.33	dicamba		
75	---	78	---
---	560	17	---
75	560	89	81

Table 74: Herbicidal action of compound Ia.3 and "quinclorac" (B14) on Ipomoea ssp. [sic] in the greenhouse (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.3	Quinclorac		
31.2	---	75	---
---	250	70	---
31.2	250	100	93

Table 75: Herbicidal action of compound Ia.3 and "quinclorac" (B14) on Veronica ssp. [sic] in the greenhouse (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.3	Quinclorac		
31.2	---	80	---
---	500	80	---
31.2	500	100	96

Table 76: Herbicidal action of compound Ia.3, "nicosulfuron" (B2) and "dicamba" (B14) on Ipomoea acuminata in the field (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.3	nicosulfuron + dicamba		
75	---	23	---
---	20 + 192	89	---
75	20 + 192	97	92

Table 77: Herbicidal action of compound Ia.3, "diflufenzopyr" (B5) and "dicamba" (B14) on Echinochloa crus-galli in the field (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.3	diflufenzopyr + dicamba		
75	---	98	---
---	56 + 140	5	---
75	56 + 140	99	98

Table 78: Herbicidal action of compound Ia.33, "diflufenzopyr" (B5) and "dicamba" (B14) on Sorghum halepense in the field (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.33	diflufenzopyr + dicamba		
75	---	78	---
---	60 + 150	27	---
75	60 + 150	90	84

Table 79: Herbicidal action of compound Ia.33, "dimethenamide" (B9) and "atrazine" (B12) on Sorghum halepense in the field (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.33	dimethenamide + atrazine		
75	---	78	---
---	840 + 960	5	---
75	840 + 960	97	79

Table 80: Herbicidal action of compound Ia.3, "bentazone" (B12) and "atrazine" (B12) on Brachiaria plantaginea in the field (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.3	bentazone + atrazine		
75	---	95	---
---	800 + 800	25	---
75	800 + 800	98	96

Table 81: Herbicidal action of compound Ia.33, "atrazine" (B12) and "dicamba" (B14) on Ipomoea lacunosa in the field (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.33	atrazine + dicamba		
75	---	69	---
---	920 + 480	83	---
75	920 + 480	99	95

Table 82: Herbicidal action of compound Ia.33, "atrazine" (B12) and "dicamba" (B12) on Setaria faberi in the field (post-emergence treatment)

Rate of application (g/ha a.s.)		Damage (%)	Colby value E
Ia.33	atrazine + dicamba		
75	---	65	---
---	367 + 193	20	---
75	367 + 193	89	72

Further experiments demonstrated that the mixtures according to the invention are crop plant selective (Tables 83 and 84).

Table 83: Phytotoxicity of compound Ia.52 and "dimethenamid" (B9) to Triticum aestivum in the greenhouse (post-emergence treatment)

Rate of application (g/ha a.s.)		Phytotoxicity (%)
Ia.52	Dimethenamide	
62.5	---	0
---	500	0
62.5	500	0

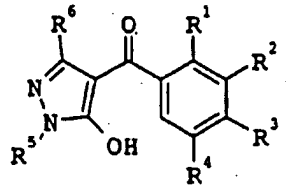
Table 84: Phytotoxicity of compound Ia.33 and "S-metolachlor" (B9) on Zea mays in the greenhouse (post-emergence treatment)

Rate of application (g/ha a.s.)		Phytotoxicity (%)
Ia.33	S-Metolachlor	
62.5	---	0
---	125	0
62.5	125	0

We claim:

1. A synergistic herbicidal mixture comprising

A) at least one 3-heterocyclyl-substituted benzoyl derivative of the formula I



I

in which the variables have the following meanings:

R^1, R^3 are hydrogen, halogen, C_1-C_6-alkyl, C_1-C_6-haloalkyl, C_1-C_6-alkoxy, C_1-C_6-haloalkoxy, C_1-C_6-alkylthio, C_1-C_6-alkylsulfinyl or C_1-C_6-alkylsulfonyl;

R^2 is a heterocyclic radical selected from the group: thiazol-2-yl, thiazol-4-yl, thiazol-5-yl, isoxazol-3-yl, isoxazol-4-yl, isoxazol-5-yl, 4,5-dihydroisoxazol-3-yl, 4,5-dihydroisoxazol-4-yl and 4,5-dihydroisoxazol-5-yl, it being possible for the nine radicals mentioned to be unsubstituted or mono- or polysubstituted by halogen, C_1-C_4-alkyl, C_1-C_4-alkoxy, C_1-C_4-haloalkyl, C_1-C_4-haloalkoxy or C_1-C_4-alkylthio;

R^4 is hydrogen, halogen or C_1-C_6-alkyl;

R^5 is C_1-C_6-alkyl;

R^6 is hydrogen or C_1-C_6-alkyl;

or one of its environmentally compatible salts;

and

B) a synergistically effective amount of at least one herbicidal compound from the group of the acetyl-CoA carboxylase inhibitors (ACC), acetolactate synthase inhibitors (ALS), amides, auxin herbicides, auxin transport inhibitors, carotenoid biosynthesis inhibitors,

enolpyruvylshikimate 3-phosphate synthase inhibitors (ESPS), glutamine synthetase inhibitors, lipid biosynthesis inhibitors, mitosis inhibitors, protoporphyrinogen IX oxidase inhibitors, photosynthesis inhibitors, synergists, growth substances, cell wall biosynthesis inhibitors and a variety of other herbicides.

2. A synergistic herbicidal mixture as claimed in claim 1 comprising, as component B), at least one herbicidal compound from the groups B1 to B16:

B1 acetyl-CoA carboxylase inhibitors (ACC): cyclohexenone oxime ethers, phenoxyphenoxypropionic esters or arylaminopropionic acids;

B2 acetolactate synthase inhibitors (ALS): imidazolinones, pyrimidyl ethers, sulfonamides or sulfonylureas;

B3 amides;

B4 auxin herbicides: pyridinecarboxylic acids, 2,4-D or benazolin;

B5 auxin transport inhibitors;

B6 carotenoid biosynthesis inhibitors;

B7 enolpyruvylshikimate 3-phosphate synthase inhibitors (ESPS);

B8 glutamine synthetase inhibitors;

B9 lipid biosynthesis inhibitors: anilides, chloroacetanilides, thioureas, benfuresate or perfluidone;

B10 mitosis inhibitors: carbamates, dinitroanilines, pyridines, butamifos, chlorthal-dimethyl (DCPA) or maleic hydrazide;

B11 protoporphyrinogen IX oxidase inhibitors: diphenyl ethers, oxadiazoles, cyclic imides or pyrazoles;

B12 photosynthesis inhibitors:

propanil, pyridate, pyridafol, benzothiadiazinones, dinitrophenols, dipyridylenes, ureas, phenols, chloridazon, triazines, triazinones, uracils or biscarbamates;

B13 synergists:
oxiranes;

B14 growth substances:
aryloxyalkanoic acids, benzoic acids or quinolinecarboxylic acids;

B15 cell wall synthesis inhibitors:

B16 various other herbicides:
dichloropropionic acids, dihydrobenzofurans, phenylacetic acids or aziprotryn, barban, bensulide, benzthiazuron, benzofluor, buminafos, buthidazole, buturon, cafenstrole, chlorbufam, xhlorofenprop-methyl, chloroxuron, cinmethylin, cumyluron, cycluron, cyprazine, cyprazole, dibenzyluron, dipropetryn, dymron, eglinazin-ethyl, endothall, ethiozin, flucabazone, fluorbentranil, flupoxam, isocarbamid, isopropalin, karbutilate, mefluidide, monuron, napropamide, napropanilide, nitralin, oxaciclomefone, phenisopham, piperophos, procyazine, profluralin, pyributicarb, secbumeton, sulfallate (CDEC), terbucarb, triazofenamide, triaziflam or trimeturon;

or their environmentally compatible salts.

3. A synergistic herbicidal mixture as claimed in claim 1 or 2, comprising, as component B), at least one herbicidal compound from the groups B1 to B16:

B1 acetyl-CoA carboxylase inhibitors (ACC):
- cyclohexenone oxime ethers:
alloxydim, clethodim, cloproxydim, cycloxydim, sethoxydim, tralkoxydim, butroxydim, clefoxydim or tepraloxydim;
- phenoxyphenoxypropionic esters:
clodinafop-propargyl (and, if appropriate, cloquintocet), cyhalofop-butyl, diclofop-methyl, fenoxaprop-ethyl, fenoxaprop-P-ethyl, fenthiapropethyl, fluazifop-butyl, fluazifop-P-butyl, haloxyfop-ethoxyethyl, haloxyfop-methyl,

haloxyfop-P-methyl, isoxapyrifop, propaquizafop, quizalofop-ethyl, quizalofop-P-ethyl or quizalofop-tefuryl; or

- arylaminopropionic acids:
  flamprop-methyl or flamprop-isopropyl;

B2 acetolactate synthase inhibitors (ALS):

- imidazolinones:
  imazapyr, imazaquin, imazamethabenz-methyl (imazame), imazamoc, imazapic, imazethapyr or imazamethapyr;
- pyrimidyl ethers:
  pyrithiobac-acid, pyrithiobac-sodium, bispyribac-sodium, KIH-6127 or pyribenzoxym;
- sulfonamides:
  florasulam, flumetsulam or metosulam; or
- sulfonylureas:
  amidosulfuron, azimsulfuron, bensulfuron-methyl, chlorimuron-ethyl, chlorsulfuron, cinosulfuron, cyclosulfamuron, ethametsulfuron-methyl, ethoxysulfuron, flazasulfuron, halosulfuron-methyl, imazosulfuron, metsulfuron-methyl, nicosulfuron, primisulfuron-methyl, prosulfuron, pyrazosulfuron-ethyl, rimsulfuron, sulfometuron-methyl, thifensulfuron-methyl, triasulfuron, tribenuron-methyl, triflusulfuron-methyl, N-[[[4-methoxy-6-(trifluoromethyl)-1,3,5-triazin-2-yl]amino]-carbonyl]-2-(trifluoromethyl)-benzenesulfonamide, sulfosulfuron or idosulfuron;

B3 amides:

- allidochlor (CDAA), benzoylprop-ethyl, bromobutide, chlorthiamid, diphenamid, etobenzanid (benzchlomet), fluthiamide, fosamin or monalide;

B4 auxin herbicides:

- pyridine carboxylic acids:
  clopyralid or picloram; or
- 2,4-D or benazolin;

B5 auxin transport inhibitors:

- naptalame or diflufenzopyr;

B6 carotenoid biosynthesis inhibitors:

- benzofenap, clomazone (dimethazone), diflufenican, fluorochloridone, fluridone, pyrazolynate, pyrazoxyfen, isoxaflutole, isoxachlortole,

mesotrione, sulcotrione (chlormesulone), ketospiradox, flurtamone, norflurazon or amitrol;

B7 enolpyruvylshikimate-3-phosphate synthase inhibitors (ESPS):
- glyphosate or sulfosate;

B8 Glutamine synthetase inhibitors:
- bilanafos (bialaphos) or glufosinate-ammonium;

B9 Lipid biosynthesis inhibitors:
- anilides:
  anilofos or mefenacet;
- chloroacetanilides:
  dimethenamid, S-dimethenamid, acetochlor, alachlor, butachlor, butenachlor, diethatyl-ethyl, dimethachlor, metazachlor, metolachlor, S-metolachlor, pretilachlor, propachlor, prynachlor, terbuchlor, thenylchlor or xylachlor;
- thioureas:
  butylate, cycloate, di-allate, dimepiperate, EPTC, esprocarb, molinate, pebulate, prosulfocarb, thiobencarb (benthiocarb), tri-allate or vernolate; or
- benfuresate or perfluidone;

B10 mitosis inhibitors:
- carbamates:
  asulam, carbetamid, chlorpropham, orbencarb, pronamid (propyzamid), propham or tiocarbazil;
- dinitroanilines:
  benefin, butralin, dinitramin, ethalfluralin, fluchloralin, oryzalin, pendimethalin, prodiamine or trifluralin;
- pyridines:
  dithiopyr or thiazopyr; or
- butamifos, chlorthal-dimethyl (DCPA) or maleic hydrazide;

B11 protoporphyrinogen IX oxidase inhibitors:
- diphenyl ethers:
  acifluorfen, acifluorfen-sodium, aclonifen, bifenox, chlornitrofen (CNP), ethoxyfen, fluorodifen, fluoroglycofen-ethyl, fomesafen, furyloxyfen, lactofen, nitrofen, nitrofluorfen or oxyfluorfen;
- oxadiazoles:
  oxadiargyl or oxadiazon;

- cyclic imides:
  azafenidin, butafenacil, carfentrazone-ethyl, cinidon-ethyl, flumiclorac-pentyl, flumioxazin, flumipropyn, flupropacil, fluthiacet-methyl, sulfentrazone or thidiazimin; or
- pyrazoles:
  ET-751, JV 485 or nipyraclofen;

B12 photosynthesis inhibitors:

- propanil, pyridate or pyridafol;
- benzothiadiazinones:
  bentazone;
- dinitrophenols:
  bromofenoxim, dinoseb, dinoseb-acetate, dinoterb or DNOC;
- dipyridylenes:
  cyperquat-chloride, difenzoquat-methylsulfate, diquat or paraquat-dichloride;
- ureas:
  chlorbromuron, chlorotoluron, difenoxuron, dimefuron, diuron, ethidimuron, fenuron, fluometuron, isoproturon, isouron, linuron, methabenzthiazuron, methazole, metobenzuron, metoxuron, monolinuron, neburon, siduron or tebuthiuron;
- phenols:
  bromoxynil or ioxynil;
- chloridazon;
- triazines:
  ametryn, atrazine, cyanazine, desmetryn, dimethamethryn, hexazinone, prometon, prometryn, propazine, simazine, simetryn, terbumeton, terbutryn, terbutylazine or trietazine;
- triazinones:
  metamitron or metribuzine;
- uracils:
  bromacil, lenacil or terbacil; or
- biscarbamates:
  desmedipham or phenmedipham;

B13 synergists:

- oxiranes:
  tridiphane;

B14 growth substances:

- aryloxyalkanoic acids:

2,4-DB, clomeprop, dichlorprop, dichlorprop-P (2,4-DP-P), fluoroxypyr, MCPA, MCPB, mecoprop, mecoprop-P, or triclopyr;

- benzoic acids:
  chloramben or dicamba; or
- quinolinecarboxylic acids:
  quinclorac or quinmerac;

B15 cell wall synthesis inhibitors:

- isoxaben or dichlobenil;

B16 various other herbicides

- dichloropropionic acids:
  dalapon;
- dihydrobenzofurans:
  ethofumesate;
- phenylacetic acids:
  chlorfenac (fenac); or
- aziprotryn, barban, bensulide, benzthiazuron, benzofluor, buminafos, buthidazole, buturon, cafenstrole, chlorbufam, chlorfenprop-methyl, chloroxuron, cinmethylin, cumyluron, cycluron, cyprazine, cyprazole, dibenzyluron, dipropetryn, dymron, eglinazin-ethyl, endothall, ethiozin, flucabazone, fluorbentranil, flupoxam, isocarbamid, isopropalin, karbutilate, mefluidide, monuron, napropamide, napropanilide, nitralin, oxaciclomefone, phenisopham, piperophos, procyazine, profluralin, pyributicarb, secbumeton, sulfallate (CDEC), terbucarb, triazofenamid, triaziflan or trimeturon;

or their environmentally compatible salts.

4. A synergistic herbicidal mixture as claimed in any of claims 1 to 3, comprising, as component A), a 3-heterocyclyl-substituted benzoyl derivative of the formula I, where R^4 is hydrogen.

5. A synergistic herbicidal mixture as claimed in any of claims 1 to 4, comprising, as component A), a 3-heterocyclyl-substituted benzoyl derivative of the formula I, where

R^1, R^3 are halogen, C_1-C_6-alkyl, C_1-C_6-alkylthio, C_1-C_6-alkylsulfinyl or C_1-C_6-alkylsulfonyl.

6. A synergistic herbicidal mixture as claimed in any of claims 1 to 5, comprising, as component A), a

3-heterocyclyl-substituted benzoyl derivative of the formula I, where

R^2 is a heterocyclic radical selected from the group: isoxazol-3-yl, isoxazol-5-yl and 4,5-dihydroisoxazol-3-yl, it being possible for the three radicals mentioned to be unsubstituted or mono- or polysubstituted by halogen, C_1-C_4-alkyl, C_1-C_4-alkoxy, C_1-C_4-haloalkyl, C_1-C_4-haloalkoxy or C_1-C_4-alkylthio.

7. A synergistic herbicidal mixture as claimed in any of claims 1 to 6, comprising, as component A), a 3-heterocyclyl-substituted benzoyl derivative of the formula I, where

R^2 is isoxazol-5-yl, 3-methyl-isoxazol-5-yl, 4,5-dihydroisoxazol-3-yl, 5-methyl-4,5-dihydroisoxazol-3-yl, 5-ethyl-4,5-dihydroisoxazol-3-yl or 4,5-dimethyl-4,5-dihydroisoxazol-3-yl.

8. A synergistic herbicidal mixture as claimed in any of claims 1 to 7, comprising, as component A), 4-[2-chloro-3-(4,5-dihydroisoxazol-3-yl)-4-methylsulfonyl-benzoyl]-1-methyl-5-hydroxy-1H-pyrazole.

9. A synergistic herbicidal mixture as claimed in any of claims 1 to 7, comprising, as component A), 4-[2-methyl-3-(4,5-dihydroisoxazol-3-yl)-4-methylsulfonyl-benzoyl]-1-methyl-5-hydroxy-1H-pyrazole.

10. A synergistic herbicidal mixture as claimed in any of claims 1 to 5, comprising, as component A), a 3-heterocyclyl-substituted benzoyl derivative of the formula I, where

R^2 is a heterocyclic radical selected from the group: thiazol-2-yl, thiazol-4-yl, thiazol-5-yl, isoxazol-4-yl, 4,5-dihydroisoxazol-4-yl and 4,5-dihydroisoxazol-5-yl, it being possible for the six radicals mentioned to be unsubstituted or mono- or polysubstituted by halogen, C_1-C_4-alkyl, C_1-C_4-alkoxy, C_1-C_4-haloalkyl, C_1-C_4-haloalkoxy or C_1-C_4-alkylthio.

11. A synergistic herbicidal mixture as claimed in any of claims 1 to 10, comprising, as component B), at least one herbicidal compound from the groups B1, B2, B4 to B12 or B14 as defined in claim 2 or 3.

12. A synergistic herbicidal mixture as claimed in any of claims 1 to 11, comprising, as component B), at least one herbicidal compound from the following groups:

B1 acetyl-CoA carboxylase inhibitors (ACC): cyclohexenone oxime ethers or phenoxypropionic esters;

B2 acetolactate synthase inhibitors (ALS): imidazolinones, pyrimidyl ethers, sulfonamides or sulfonylureas;

B4 auxin herbicides: pyridinecarboxylic acids or 2,4-D;

B5 auxin transport inhibitors;

B6 carotenoid biosynthesis inhibitors;

B7 enolpyruvylshikimate 3-phosphate synthase inhibitors;

B8 glutamine synthetase inhibitors;

B9 lipid biosynthesis inhibitors: chloroacetanilides or thioureas;

B10 mitosis inhibitors: dinitroanilines;

B11 protoporphyrinogen IX oxidase inhibitors: diphenyl ethers, oxadiazoles, cyclic imides or pyrazoles;

B12 photosynthesis inhibitors: pyridate, pyridafol, benzothiadiazinone, dipyridylenes, ureas, phenols, chloridazon, triazines or triazinones;

B14 growth substances: aryloxyalkanoic acids, benzoic acids or quinolinecarboxylic acids.

13. A synergistic herbicidal mixture as claimed in any of claims 1 to 12, comprising, as component B), at least one herbicidal compound from the following groups:

cycloxydim, sethoxydim, clodinafop (and, if appropriate, cloquintocet), fenoxaprop-ethyl, fenoxaprop-P-ethyl, imazapyr, imazaquin, imazamethabenz, imazethapyr, pyrithiobac-sodium, metosulam, halosulfuron-methyl, nicosulfuron, N-[[[4-methoxy-6-(trifluoromethyl)-1,3,5-triazin-2-yl]amino]carbonyl]-2-(trifluoromethyl)-benzenesulfonamide, flufenacet, 2,4-D, diflufenzopyr, isoxaflutole, sulcotrione, glyphosate, glufosinate-ammonium, dimethenamid, S-metolachlor, benthiocarb, pendimethalin, acifluorfen, carfentrazone-ethyl, cinidon-ethyl, pyridate, bentazone, paraquat-dichloride, diuron, isoproturon, bromoxynil, chloridazon, atrazin, metribuzin, MCPA, dicamba and quinclorac.

14. A synergistic herbicidal mixture as claimed in any of claims 1 to 12, comprising, as component B), at least one herbicidal compound from the group:
codinafop (and, if appropriate, cloquintocet), diflufenzopyr, imazethapyr, flumetsulam, pyrithiobac-sodium, nicosulfuron, N-[[[4-methoxy-6-(trifluoromethyl)-1,3,5-triazin-2-yl]amino]-carbonyl]-2-(trifluoromethyl)-benzenesulfonamide, clopyralid, 2,4-D, isoxaflutole, glyphosate, glufosinate-ammonium, dimethenamid, S-dimethenamid, acetochlor, metolachlor, S-metolachlor, pendimethalin, carfentrazone-ethyl, pyridate, bentazone, diuron, bromoxynil, atrazine, terbuthylazine, metribuzin and dicamba.

15. A synergistic herbicidal mixture as claimed in any of claims 1 to 5, 11 to 14, comprising, as component A), a 3-heterocyclyl-substituted benzoyl derivative of the formula I where

R^2 is a heterocyclic radical from the group: 4,5-dihydroisoxazol-3-yl, 4,5-dihydroisoxazol-4-yl and 4,5-dihydroisoxazol-5-yl, it being possible for the three radicals mentioned to be unsubstituted or mono- or polysubstituted by halogen, C_1-C_4-alkyl, C_1-C_4-alkoxy, C_1-C_4-haloalkyl, C_1-C_4-haloalkoxy or C_1-C_4-alkylthio.

16. A synergistic herbicidal mixture as claimed in any of claims 1 to 5, 11 to 14, comprising, as component A), a 3-heterocyclyl-substituted benzoyl derivative of the formula I, where

R^2 is a heterocyclic radical from the group: thiazol-2-yl, thiazol-4-yl and thiazol-5-yl, it being possible for the three radicals mentioned to be unsubstituted or mono- or polysubstituted by halogen, C_1-C_4-alkyl, C_1-C_4-alkoxy, C_1-C_4-haloalkyl, C_1-C_4-halolkoxy or C_1-C_4-alkylthio.

17. A synergistic herbicidal mixture as claimed in any of claims 1 to 5, 11 to 14, comprising, as component A), a 3-heterocyclyl-substituted benzoyl derivative of the formula I, where

R^2 is a heterocyclic radical from the group: isoxazol-3-yl, isoxazol-4-yl or isoxazol-5-yl, it being possible for the three radicals mentioned to be unsubstituted or mono- or polysubstituted by halogen, C_1-C_4-alkyl, C_1-C_4-alkoxy, C_1-C_4-haloalkyl, C_1-C_4-haloalkoxy or C_1-C_4-alkylthio.

18. A synergistic herbicidal mixture as claimed in any of claims 15 to 17, comprising, as component B), at least one herbicidal compound from the groups B1, B2, B4 to B11 or B14 as defined in claim 2.

19. A synergistic herbicidal mixture as claimed in claim 15 or 16, comprising, as component B), at least one herbicidal compound from the groups B12 as defined in claim 2.

20. A synergistic herbicidal mixture as claimed in any of claims 15 to 17, comprising, as component B), at least one herbicidal compound from the following group:

propanil, pyridate, pyridafol, dinitrophenols, dipyridylenes, triazinones, uracils or biscarbamates.

21. A synergistic herbicidal mixture as claimed in any of claims 1 to 20, comprising, as component A), a 3-heterocyclyl-
substituted benzoyl derivative of the formula I and, as component B), a herbicidal compound as defined in any of claims 1 to 20.

22. A synergistic herbicidal mixture as claimed in any of claims 1 to 20, comprising, as component A), a 3-heterocyclyl-substituted benzoyl derivative of the formula I and, as component B), two herbicidal compounds as defined in any of claims 1 to 20.

23. A synergistic herbicidal mixture as claimed in any of claims 1 to 12, comprising a 3-heterocyclyl-substituted benzoyl derivative of the formula I and, as component B), a herbicidal compound as defined in any of claims 1 to 12 and a herbicidal compound from the groups B12 and B14.

24. Synergistic herbicidal mixture as claimed in any of claims 1 to 23, wherein component A) and B) are present in a weight ratio of 1:0.002 to 1:800.

25. Synergistic herbicidal mixture as claimed in claim 24, wherein component A) and component B) are present in a weight ratio of 1:0.003 to 1:160.

26. A herbicidal composition comprising a herbicidally active amount of a synergistic herbicidal mixture as claimed in any of claims 1 to 23, at least one inert liquid and/or solid carrier and, if desired, at least one surfactant.

27. A herbicidal composition as claimed in claim 26, wherein component A) and component B) are present in a weight ratio of 1:0.002 to 1:800.

28. A herbicidal composition as claimed in claim 27, wherein component A) and component B) are present in a weight ratio of 1:0.003 to 1:160.

29. A process for the preparation of herbicidal compositions as claimed in claim 25, wherein component A, component B, at least one inert liquid and/or solid carrier and, if appropriate, a surfactant are mixed.

30. A method of controlling undesired vegetation, which comprises applying a synergistic herbicidal mixture as claimed in any of claims 1 to 23 before, during and/or after the emergence of undesired plants, it being possible for the herbicidally active compounds of components A) and B) to be applied simultaneously or in succession.

31. A method of controlling undesired vegetation as claimed in claim 30, wherein the leaves of the crop plants and of the undesired plants are treated.